# THE FOUNDRY

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## Blackening Dry Sand Molds With Compressed Air.

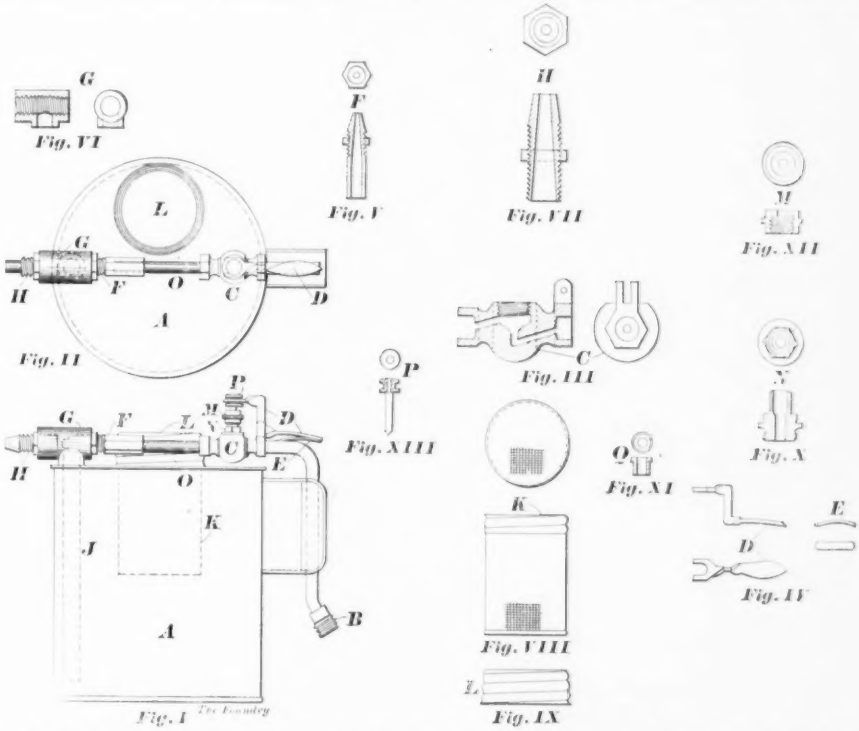
By I. B. THOMAS.

The uses of compressed air are increasing daily, and there would appear to be no place where there are more opportunities for its successful and beneficial application than in the foundry.

At the present we are familiar with it as applied to molding machines, cranes or hoists, chipping castings, cleaning by means of sand blast, etc., but have never heard of its application to the spraying of blackening, or liquid facing, on dry sand molds, though a similar machine to the one here described and illustrated has been used as a paint-sprayer for some time past.

Fig. 1 shows a side, and Fig. 2 a plan view of the sprayer can "A," which is 7½" high by 7" in diameter, and made of No. 9 galvanized iron.

The construction and operation are very simple indeed. The blackening after being thinned to the proper consistency with molasses water is introduced through an opening, closed by the screw top "L" (Figs. 1, 2 and 9). Inside this opening is screwed a strainer, "K" (Figs. 1 and 8), made of brass wire 0.04" thick, and with ten meshes per inch. This is made removable to permit of its being cleaned, and is quite essential to prevent foreign matter clogging the pipe "J" and spraying nozzle "H" (Fig. 1). An air hose is connected at the unions "B" (Fig. 1), and compressed air, at a pressure of from 80 to 100 pounds per square inch, admitted to the valve "C" (Figs. 1, 2 and 3). This valve is simply a ¼" globe valve body cast solid; but with a lug added as shown in Fig. 3. One-eighth-inch holes are drilled in from either end, and from the top and the bonnet "N" (Fig. 10) properly fitted on. This bonnet is constructed so as to form the stuffing-box



for pin valve "P" (Figs. 1 and 13). Fig. 11 shows the gland "Q" and Fig. 12 the nut "M." The valve is very readily operated, by means of the thumb on the lever "D" (Figs. 1 and 2), shown in detail in Fig. 4. One-quarter-inch copper pipe connects the valve "C" with the air nozzle "F" (Figs. 1, 2 and 5). This is screwed into the tee "G" (Figs. 1, 2 and 6), and like the combining and spraying nozzle "H" (Figs. 1, 2 and 7), is made adjustable, as, on the proper relative position and size of these nozzles and the consistency of the liquid to be sprayed, depends the efficiency of the machine. A small hole, say 1-8″ or 3-16″ in diameter, should be punched in the top "L" (Figs. 1 and 9), to allow the full atmospheric pressure to act on the liquid in the can, forcing it to fill the vacuum created in tube "J" when the air valve is opened.

With the nozzles proportioned and set as shown, a heavy spray of blackening will be thrown with considerable force, driving it into the pores of the sand and into the pockets and corners, almost inaccessible by the swab. Further, it can be applied with much greater uniformity—a thing every founder will appreciate if he desires fine-looking castings. The skill required to properly handle a swab is not here required. Driving the blackening into the pores is of great advantage, not only preventing the iron fromm burning into the sand, but it greatly facilitates the work of slicking, as the blackening will not curl and tear off after the slick so easily.

We employ it constantly on our cylinder molds and large cores, and consider it a most useful and beneficial tool. It is rather quicker than the swab, and as the coating is more uniform we believe there is some economy in the amount of blackening; certainly, the results obtained are worthy of consideration.

## Trouble With a Piston Casting.

By L. C. JEWETT.

Fig. 1 is a section through the casting, core and feeding heads; fig. 2 shows the piston after the grooves have been turned for the expansion rings, and fig. 3 is an end view. At bbbb, fig. 1, the core cuts through the ends of piston, as shown at c, fig. 3, this opening being ¼-inch wide. Also, at dd, fig. 1, the core extends to the surface, making a hole 1¾ inches diameter, to be bored to 2⅛ inches, to receive the piston rod. The dotted lines, fig. 3, show where the core is slotted to form braces, or strengthening brackets in the casting, as shown at eeee, fig. 1.

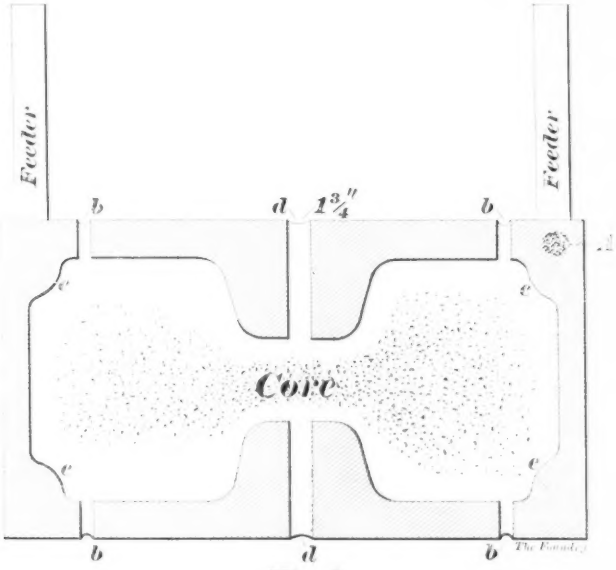



*Fig. 1*

The difficulty with this job was that, after turning, an imperfection would frequently appear at the point marked A, figs. 1 and 2. It will be seen that the core at bbbb, fig. 1, is extremely fragile, and so narrow that no vent wire could be used here; as these

apertures were to be fitted with valves, it was necessary that the casting be quite sound through these sections, as well as throughout the areas where the grooves for expansion rings were turned. Under the circumstances, it was necessary to take off all the vent through the up-branch of the 1¾-inch core at the center. The contracted center of body of core through which a strong arbor ran also increased the difficulty of venting. The mold was made entirely in dry sand; the upper branch of hub-core being pasted in after the main core was set in the mold.

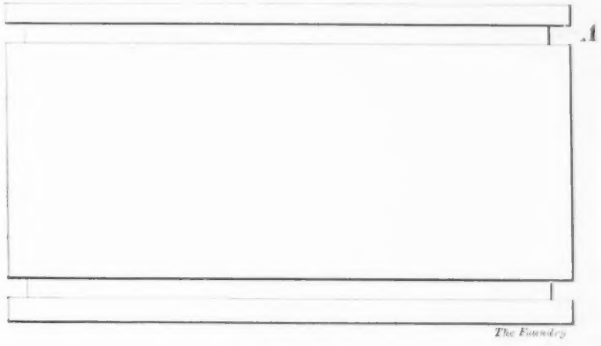



*Fig. 2*

The castings always appeared to be perfectly sound till, sometimes, the last cut, in turning out the groove on the end of piston that was uppermost when cast. This was a 26-inch piston, and the difficulty did not appear in the larger sizes, wherein the comparative space for core-irons was greater.

The feeding-heads used on this piston were 2½"x3", twelve to fifteen inches high, and both were churned from moment of pouring (the risers being filled to within 1" of top), so nervously frantic had they become from the many losses.

All sorts of things had been done to cure the difficulty, as in all such cases where disaster seemed to have named that particular job as its own, many of them foolish and ineffective; but to let no stone be unturend, they were ready to do anything and everything. At last they had the iron analyzed by a chemist, and he pronounced the trouble due to shrinkage. They had a yard full of the best brands of iron—cold blast charcoal, anthracite, coke, old car wheels

*Fig. 3*

and their own scrap (which was a lamentable sight). They were making larger sizes of these pistons, of thicker section, without much trouble, there being but few losses.

They would fill a 5,000-pound ladle, and pour three or four pistons of various sizes, and the 26-inch one would show this particular defect, while the others would not, and still, it was insisted that the trouble was due to shrinkage! After pouring, and when the pumping rods were inserted, the molten metal would surge up like a yeast pot, showing that the expansion of the core would more than take care of the shrinkage. Some of these were cast without any feeding or pumping, and the per cent. of good ones was in this case as great as in the former; and they scratched their heads and were right glad when they came sound, but were ready to ascribe the very next loss to shrinkage!—no investigation as to why the one was good, the other bad;—had not the chemist said "shrinkage?" and did not nearly all the workmen consent thereto? What was the use of bothering about the question "why?"

The writer, being called to investigate the matter, pronounced it due to inadequate vent from the main core; the core being made of too close material, and not being thoroughly dried. Cores were then made with provisions for better vent, though the outlet was no larger, that being limited by the size of the core, but the sand was more open, and cinders were used in the bulky parts of the core, and the drying was thorough, with the result that all of the pistons made with this lot of cores were good; but I have learned that the opinion still prevails in that foundry that their losses had been due to "shrinky" iron.

It is a well-known fact that castings made in dry sand do not shrink so much as those made in green sand. The surface of the cavities had the familiar smooth appearance characteristic of cavities due to an air bubble in an open sand casting.

The writer realizes that he may be wrong in his conclusions, and he would be pleased to read the opinions of others upon this question in the columns of THE FOUNDRY.

## Molding Cast Iron Columns.

By JOHN C. KNOEPPEL.

In order to success in the molding and casting of columns and other housework, great skill is required, and experience counts for much to the workman engaged therein. Having had many years' experience in this line, the writer hopes he may be able to give some points that will be helpful to young molders.

Upon a certain occasion it was required of me to make two columns for a day's work, which was more by considerable than had been the custom. It crowded me badly, and the second column blowed and was lost. This same thing happened for several days in succession, and it seemed as if I never should be able to find the cause; till one day I made a close examination of the green sand core, and observed that, down near the bottom, there was a soft spot. This revealed the secret; the molten iron had come into contact with the core arbor, which, as every molder knows, will insure an explosion. After that as many as fifty columns were made without the loss of one.

The accompanying cuts illustrate a rigging that we used in making this work. Fig. 1 is the frame bolted together, of dimensions to suit the work. The flanges are for the purpose of stiffening the frame, and also serve for clamping, as shown in fig. 5, where the cope and frame are clamped together. The cope is provided with handles, and also with trunnions, so that it may be easily rolled over to facilitate finishing (see fig. 2). This cope is made in one piece; but if so desired, it may be cast in sections and bolted together.

The standards on which the cope rests while it is being finished are shown, side and end view, at figs. 3 and 4.

The frame (fig. 1) is sunk in the ground to the floor line, and two planks are laid on the bottom, as shown in section, at fig. 5, then cinders are thrown in and brought up level with the bottom of the two straight edges shown in section just under the hand strike (fig. 5). Sand is now put in, rammed, and struck level, the depth of bed surface below the floor line being governed by size of column to be molded.

Fig. 6 shows one of the brackets of which the frame (fig. 1) is made. They are 1" thick, 3" face, and are 4 or 5 feet deep, by 3 or 4 feet wide; all dimensions, of course, depending on the size of the work to be made in the frame. Copes of smaller size may be used with this frame by laying bars across the top for clamping. Before proceeding to mold the column in this frame, the bed should be well vented down to the

coke bed below. This rigging is for molding square columns, lintels, girders and heavy bedding-in work. Round columns require a complete flask.

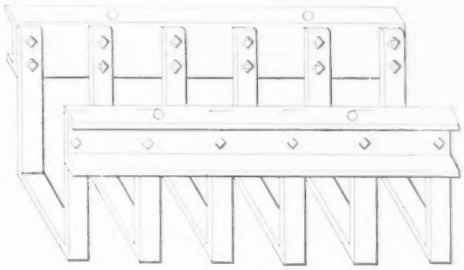


Fig. 1

Fig. 7 illustrates a stationary core box. Make the bottom of several pieces of 3" plank, battened on the under side with 6"x6" pieces, about two feet apart, and then plane the surface true. The stationary side of core box should be of heavy plank, supported by brackets (see figs. 9 and 10), which are bolted to the bottom, which extends be-

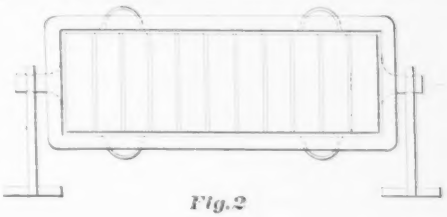


Fig. 2

Fig. 3

Fig. 4

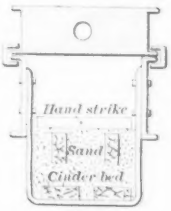



Fig. 5

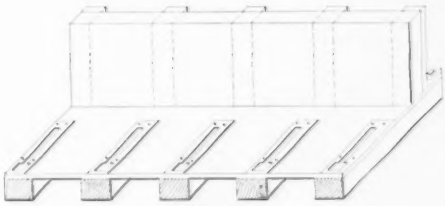


Fig. 7

Fig. 6

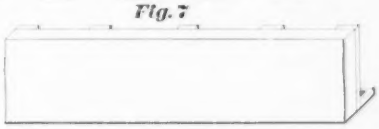


Fig. 8

Fig. 9

Fig. 10

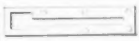


Fig. 11

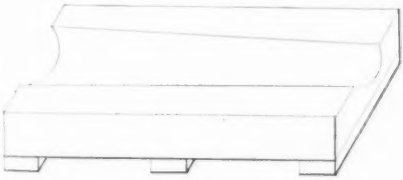


Fig. 12

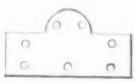


Fig. 13

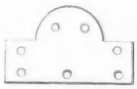


Fig. 14

Fig. 15

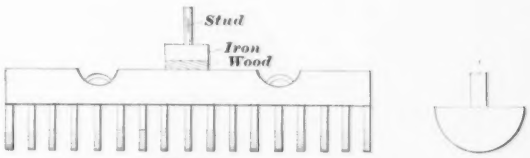



Fig. 16

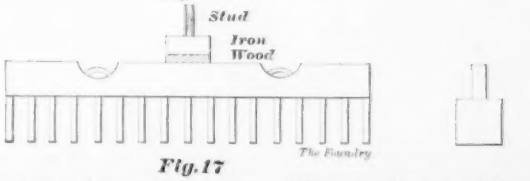



Fig. 17

Green sand cores are preferable for square columns, as they make a cleaner job, and are more easily removed from the casting.

yond the upright side for this purpose. Do not fail to use the square and straight edge in doing this job.

Fig. 8 shows the cleated plank which is to form the opposite side of box. This is adjustable; slotted plates (fig. 11) are screwed to the bottom, as seen in fig. 7, to receive the head of bolts which pass up through the cleats attached to the adjustable side. The cleats on the bottom should be covered with coal tar, to prevent rot. Secure a permanent location for the box, and, having put it together properly, set it on a solid, level bed. The core arbor (fig. 17) is made in open sand, and is provided with "eyes" to receive hooks wherewith the core is to be handled.

To make the core, saw off a few boards of length equal to diameter of core required, lay them along on the bottom of the box (fig. 7), then set up the loose side (fig. 8), bringing it up to the ends of the boards, and secure it in this position. Now, remove the pieces of board, and riddle in sand to the depth of 1 inch. Throw a little flour over the sand and place the core arbor (fig. 17), driving it down to place. Tack a couple sticks across from side to side of the ends of box to prevent spreading while ramming up; vent often while ramming up, which latter may be pretty hard at the lower part of core, but softer toward the top. Lay ¾-inch vent rods in the core and withdraw them after the ramming is finished. Figs. 16 and 17 show the method of holding the core down for casting. The core is cut away at the center enough to permit a block of wood to rest on the iron arbor, then a block of iron is added, which should reach to a level with top side of core; fill in with sand around these, and oil the iron block on top, exposed surface, to prevent trouble when the molten iron strikes it. The stud is extended down through the cope and its lower end stands on the iron block, the upper end being wedged down under a crosspiece athwart the cope.

The ends of the mold are formed with stop-off cores with the pouring gates in them. The vent rods are placed in the core and left till after the cope is closed on.

In making round column cores, a half-box is used (see fig. 12). The arbor (fig. 16), is set in, and the core made half way up. Then figs. 13 and 14 are screwed on the ends of the box, and fig. 15 across the center, or midway of the ends; these form templets by which to strike the upper half of the round core. As may be seen by reference to the arbor (fig. 16), the same means are employed for holding down in the mold as in the case of square cores.

The vent rods in all cases should be close to the arbor, for, if they approach the surface, trouble will ensue from the sand being forced off in places.

In conclusion, let me note that the object in bedding a wood block in the core under the iron block on which the stud rests is to allow for contraction—the wood rapidly burns away, and so does not cause the column to crack when it shrinks upon the core.

## A Large Hoisting Drum.

We illustrate herewith the middle section of a large cast iron hoisting drum, made at the foundry of Fraser & Chalmers, Chicago, Ill. The drum was molded in three sections, the one shown being a little over 7 feet long by 25 feet diamater; the two end sections each being of like diameter at one end and narrowing to 6 feet at the outer end, and a little over 7 feet long, the complete drum measuring 21 feet 7¾ inches in length. The sections have corresponding male and female joints, and are properly flanged for bolting together.

Each of these sections was split into six smaller sections by means of cores; this was necessary to facilitate handling so heavy a casting. Lugs were provided at each of the split joints, for bolting together.

The complete drum was attached to the shaft by means of cast iron spiders, spanning each end. The metal is ⅞″ thick at the bottom of grooves, of which there are 49 in the middle section and 33 in each of the end sections, the pitch being 1¾-inch.

The grooves are extra deep in the conical end sections, to prevent possibility of the rope slipping off. The complete drum holds 8,125 feet of 1½-inch rope, the middle section alone holding 3,875 feet.

The greater part of the mold stood above the level of the floor, and strong curbing was built around it and sand rammed between to prevent possible bursting of the mold while casting.

The building of the mold and core required 37,000 brick, and the special facilities, such as bottom plates, lifting plates, binders, etc., required 88 tons of iron.

To facilitate handling, the cores for each section were made in three parts, the total

weight of same being about 105 tons. Each of the three sections required about 35 tons of iron for pouring, the latter operation taking 70 minutes' time.

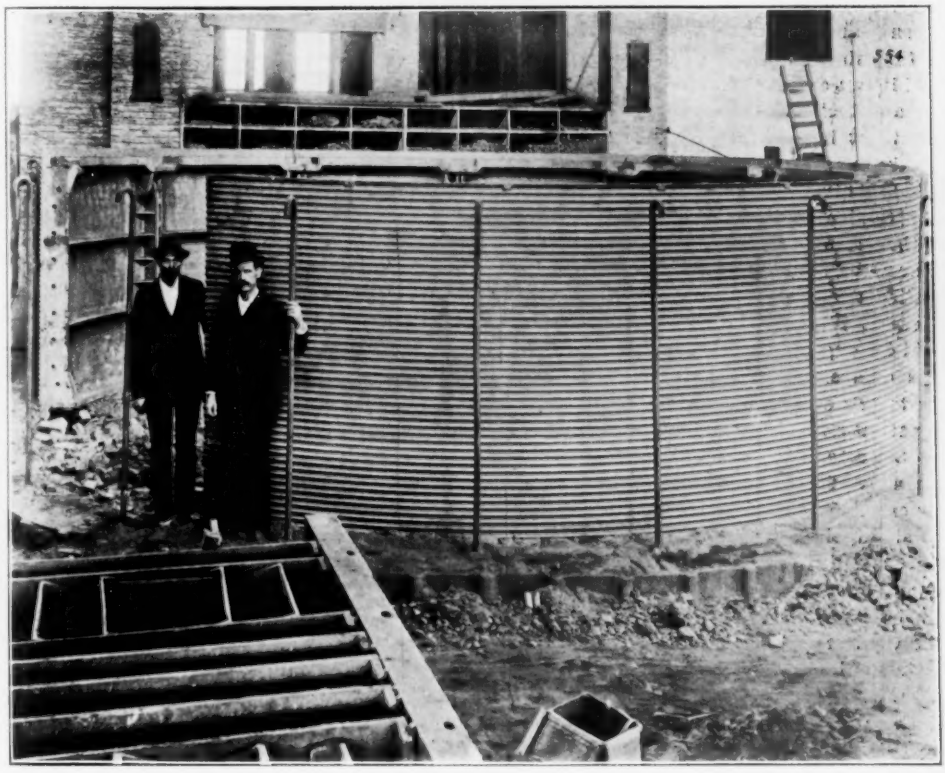
Several courses of loam brick were laid in the core, and these were torn away immediately after pouring to permit the casting to contract without danger of cracking.

### Philadelphia Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, on Wednesday, December 7, the president, P. D. Wanner, occupying the chair.

The report of the Executive Committee referred to the death of Thomas Glover, of the firm of Glover Brothers, Frankford, a member of the association and a member of the Executive Committee since the formation of the association in 1891. In regard to the foundry trade the committee report stated: Until five or ten years ago foundry engineers were sent to this country from the old world to teach the ways and means of making perfect and clean castings for the least cost, and to introduce methods and appliances which they considered better than were in use here. The tables seem to have turned now. Foundry practice in this country has developed to such an extent that it is considered ahead of the times, and in consequence there have been many inquiries recently from the other side of the water for our improved appliances and equipment.

J. H. Mueller, of the Hy. McShane Mfg. Company, and John S. Kennedy, of the Sheridan Iron Company, Sheridan, Pa., were elected to membership in the association.



A Large Hoisting Drum.

The treasurer reported a good balance in hand and all bills paid.

The subject, "Who is responsible for loss of customers' patterns in the case of a fire in foundry buildings?" was next brought up for discussion.

A. W. Goodell: I should like to hear from members as to what is their practice in regard to the insurance of patterns in the foundry. In the experience of my firm, covering over forty years, we have never lost

$10 on patterns and have never carried any insurance on our customers' patterns. We have always considered that it was their duty to carry the insurance. One of our customers wanted us to insure his patterns, but we would not consider the question at all. I should like to know what has been the custom in other foundries. As far as I know it has been the same as ours.

Josiah Thompson: We have just had a fire in our foundry, and it was not our first fire. This time we had patterns belonging to a customer burned. The owner wanted to know what we were going to do in the matter. We had orders for work from these patterns, and the customer said he would not furnish the patterns again unless we gave him an order. We finally gave him the order and included the cost in our insurance as patterns burned. He expected us to replace those patterns or lose his trade. There was a loss of time to both parties concerned.

The Chairman: As an attorney, I might say that a foundryman to whom patterns are brought is not expected or should not be called upon to exercise more than ordinary care. I do not think the foundryman should be expected to insure those patterns at his own expense. All he is expected to do is to use ordinary care. If a fire occurs and patterns are burned, and negligence or carelessness can be proved, I think the foundryman would be responsible, but in no other case. That would be my view from a legal standpoint.

Mr. Goodell: Is it customary for foundrymen as a general thing to carry insurance on patterns?

The Chairman: I have never known it to be asked. I think when a man sends his patterns away he must run the risk or insure them himself. All he can ask or expect is reasonable care.

Mr. Thompson: I might mention a case where a customer carried insurance on his patterns at our place, and recently came over to overhaul them. He discarded some worthless patterns on which he had been carrying insurance for ten or twelve years. These patterns were occupying the best part of our pattern room. Some of them were too heavy to carry back and forth when castings were required, so we had to store them.

Mr. Evans: A foundryman in this room to-night told me he had in his possession all the patterns of a machine shop which have accumulated during many years. In case of fire it would cripple the machine shop to such an extent as to require a year for the duplication of the patterns. Under those circumstances is a foundryman liable for any portion of the loss of time or failure to produce castings when required?

The Chairman: Ordinary care is all that could be called for.

Stanley G. Flagg, Sr.: Would it not be imperative when a customer brings patterns to a foundry to ascertain whether they are to be insured or not?

The Chairman: I do not think so.

Mr. Flagg: Then is it not proper for the customer to ascertain whether the patterns are insured or not?

Mr. Wanner: Yes, it is an important thing to ascertain.

F. A. Riehle: Customers having patterns in our foundries should know whether we are insuring them or not. We might presume one thing, and they another; therefore, if foundries in this section of the country would have an understanding in the matter at the time of making a contract it might lead to a proper precedent for foundries in other sections. I think it is wise to receive nothing in the way of patterns until the question has been noted in the contract. It would be easy to act harmoniously and have an understanding in all such cases.

Thos. F. Rankin: If, as our president remarked, the law requires that a man shall do the best he can in regard to the care of patterns, having done so it should exonerate him from all blame. It seems to me a preposterous proposition that any man should consider when he takes patterns to a foundry and gets an ordinary price on castings, that the expense of insurance is included. When a man leaves his patterns at the foundry there comes, in my judgment, a clear case of carelessness on the part of the owner of the patterns, and I should ask him in such a case whether he had done all that was necessary on his part to insure those patterns. I do not believe one man in fifty getting castings from a foundry takes half as much care of his patterns as he expects others to have for them. It seems to me entirely out of reason for any one to suppose that he can leave patterns at a foundry promiscuously. The chances are that such a man would not know what patterns he had until a fire destroyed them, and then he would come on the foundryman for a loss.

The Chairman: That is a good statement of the case, and it is not necessary to go beyond it. If the custom was established of insuring those patterns you would soon be making it a matter of liability for all foundrymen. For that reason it would be dangerous to establish a precedent. Leave the matter where it is.

Mr. Thompson: We should have to put up storage sheds for patterns only used once and which might well be thrown away.

Mr. Evans: Suppose we pass a resolution showing the sense of this meeting to be that all foundrymen doing work for customers should inquire as to whether or not it was expected that the foundryman would be held responsible for the patterns in case of fire. That would bring the matter to a head.

T. B. Harkins: It would be better to ignore the whole thing. Foundrymen should not be responsible for patterns. I have been in business twenty-seven years, and we have a lot of stuff around the place fit for nothing but firewood, yet in case of fire the owners of these patterns might send in a claim for their original value. I can only remember one case where a customer questioned us concerning fire loss. In that case we ignored responsibility.

Mr. Flagg: I don't think you could get insurance companies to insure the patterns. It is hard enough to get insurance on our own patterns.

Mr. Wanner: Leave well enough alone, that is the best course. The discussion seems to have brought out that foundrymen do not consider themselves responsible for patterns except in so far as reasonable care goes, and they are bound to give that. If patterns were destroyed by fire in a foundry and it could be shown that the fire could have been averted, a liability would exist, but not otherwise.

Mr. Riehle: I will move this resolution:

"Resolved, That it is the sense of this meeting that foundrymen should not hold themselves responsible for the destruction, by fire or water, of patterns belonging to other parties, in any way whatever."

The motion was carried, and the discussion closed.

The president named a committee to frame a resolution in reference to the death of Mr. Glover, and appointed Thos. F. Rankin to the vacancy on the Executive Board.

The proceedings closed with an interesting talk by C. L. Prince, of the Camden Iron Works, Camden, N. J., on "Water Pipes, Past and Present." Mr. Prince showed fifty-eight lantern slides, many of which covered different stages in the manufacture of the cast iron water pipes used at the present day.

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### JANUARY MEETING.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Wednesday, January 4, the president, P. D. Wanner, occupying the chair:

The Executive Committee reported as follows:

"It is impossible to tell at this early date what the new year will have in store for us. All of the dark clouds have passed away and the American people are at peace with all nations. The balance of trade is in our favor, and gold is coming to our shores in large quantities, therefore it would seem that a prosperous year is before us. The last year was a good one in many ways particularly as regards foreign trade. We are told that the exports of grain, agricultural machinery, steel rails, locomotives, machinery, cast iron pipe, malleable iron castings, etc., have been greater than ever before. This, to say the least, is very satisfactory, and the iron, steel and brass foundries of this country have profited. Unusual efforts are being made looking for foreign trade, and what has once been done can be done again; therefore, if all records have been broken during the past year in the shipments of the articles named above, it would seem that the year 1899 would be another record-breaker. While looking for foreign trade we must not neglect our domestice trade. We have no doubt our shops and factories will depend to a greater extent on that than on expert trade, and we look for a larger business than ever before, as those who have kept their money tied up in banking institutions and stockings will feel safe in making good investments. We have nothing to do, then, but to wait for further developments."

The committee having charge of the preparation of a memorial on the death of Thomas Glover, late a member of the association, made a report in the form of a memorial, which upon motion was ordered to be spread upon the minutes, and furthermore properly engrossed and forwarded to the relatives of the deceased.

The president called attention to the bill now before the United States Senate in rela-

tion to the protection of American shipping in the matter of carrying freights, and Jas. S. Stirling presented the following resolution, which was duly carried and copies ordered to be forwarded to senators and representatives of the State:

"Whereas, Ninety per cent. of the imports and exports of the United States are carried in foreign ships, which annually receive from the people of the United States a sum estimated at $200,000,000, which is taken out of the country in gold or its equivalent and contributes to the employment of aliens abroad, while at the same time depriving our own people of the employment that sum would constantly give if it were retained in the United States; and

"Whereas, A bill has been introduced in the Senate of the United States (No. S. 5024) by Honorable M. A. Hanna, and in the House of Representatives (No. H. R. 11,312) by Hon. S. E. Payne, the purpose of which is to restore to American ships a fair share of our foreign carrying, to the end that the money so expended may be retained in the United States, giving employment upon our farms, our mines, our forests, our factories, in our shipyards, and on board our ships to our own people; therefore, be it

"Resolved, That the Foundrymen's Association favors the adoption of Senate bill No. 5024 and House bill No. 11,312, which are identical, at the present session of Congress, and respectfully requests that each of the senators and the representatives from this district, in Congress, do their utmost to secure the passage of these bills, in the interest of the people of the entire United States and for the more adequate defense of the nation."

F. A. Richle called the attention of the meeting to the low prices for castings existing in the foundry trade in the face of the better condition of trade in general. He believed, he said, that the time had arrived when better prices should be insisted upon.

The chairman expressed himself as being of the same opinion, and stated that at the recent letting of the contract for the supply of cast iron pipe required by the city of Philadelphia four or five of the foundrymen bidding put in prices showing $1.50 to $2 per ton advance on the prices at which the last contract was awarded. The contract was taken, however, by a founder who bid the prices which ruled last year. As far as his company were concerned, they were going to ask better prices, and if all would do it some profits could be secured during the next ten or fifteen years. He thought the matter of asking higher prices for castings should come up for general discussion at the next meeting of the association.

After some discussion Joseph Thompson moved the following resolution:

"Whereas, It is the sense of this association that the selling prices of castings are and have been for some time much too low to admit of honest and reasonable profits to founders; therefore,

"Resolved, That this association recommends every foundryman to establish higher prices for castings of all kinds, and that at the next meeting of the association the subject be taken up for general discussion, and that founders not members of the association be invited to attend such meeting and make suggestions as to the best course to take to secure a general advance in prices; further,

"Resolved, That the co-operation of the other foundrymen's associations in the country be invited."

The resolution was carried unanimously.

John Birkinbine then made an address, with sixty-eight lantern slide illustrations, on "The Basis of the Iron Industry," as follows:

In opening my last report to the United States Geological Survey I made the following statement: "The year which ended December 31, 1897, was the banner year of pig iron production in the United States. The output was 9,652,680 gross tons and was also the largest ever reported by any country in one year. It is therefore natural to expect that the American iron ore industry, which supplied raw material for the manufacture of pig iron, would also reach its maximum output in 1897. This was the case. The total for the whole country reached 17,518,046 long tons of iron ore, which is 1,221,380 long tons, or 7.49 per cent., more than the former maximum of 16,296,666 long tons in the year 1892. During the year twenty-five States and Territories contributed to the total. The mean production for the nine years 1889-1897 was 14,932,261 long tons.

The domestic iron ore produced in 1897 represents a volume of excavation equivalent to forty acres dug to an average depth of 100 feet. This does not include the barren earth or rock necessarily removed in exploitation. Probably 30 per cent. of the ore is won from open excavations, some of them covering many acres, and 70 per cent.

is taken from underground workings, some of which exceed 1,000 feet in depth and extend long distances from slopes or shafts sunk into ore lenses or veins.

Within a few days of the close of 1898, estimates only can be offered, but it is probable that the blast furnaces of the United States produced in 1898 over 11,000,000 gross tons of pig iron, and that in the same year our domestic iron ore mines supplied about 20,000,000 gross tons of ore, a decided increase over the figures for 1897. This requires that over 50,000 tons of iron ore must be supplied daily.

All of the iron ore won is not smelted into pig iron; some of it is used as flux in silver melting, but this is offset by cinder, zinc residuum, etc., fed to blast furnaces.

This country also imports over 500,000 tons of ore annually, Cuba and Spain, under normal conditions, being the most prominent contributors.

The average for the country is nearly two tons of mineral required per ton of pig iron made. Most of this mineral is mined, transported by rail or water hundreds of miles, with five or more transfers to and from different vehicles, and when it reaches the furnaces requires a ton or more of fuel and one-third of a ton of limestone to smelt it. Both of these must also be mined or quarried and transported. Adding the labor, superintendence and other expenses, interest on large investments on the furnaces, etc., and transportation to your foundries, you may wonder how you can purchase pig iron for less than one-half cent per pound.

This is possible because of intelligent management and labor-saving appliances introduced at the mines, and the methods of handling and shipping them produced methods which are copied in other countries and recognized as the best in the world.

There are in this country ore mines 500 feet or more below the surface, where iron ore requiring blasting is broken down, loaded on tram cars, which are hauled to shafts and there elevated to the surface and delivered into railroad cars at a cost below 60 cents per ton, including timbering (some of it elaborate), explosives, labor, light and all supplies; in fact, everything but royalties and profit, the latter microscopic. The average cost of all ore mined in 1898 in the United States approximates $1 per ton on cars at the mine.

The foundries are large consumers of pig iron, but the steel plants lead in this and fully one-half of our domestic product is of Bessemer grade.

Although iron ores are found in most of the States and are mined regularly in twenty-five or more of them, three-fourths of the output is represented by the continued production of Michigan, Minnesota and Alabama. Pennsylvania, which now holds fourth place, was formerly the leader, but Michigan took this rank between 1880 and 1890 and has continued to hold it, being now, however, closely pressed by Minnesota. The totals show that Minnesota, which until fifteen years ago contributed no iron ore, has mined in the interval 30,000,000 long tons. To obtain this, towns and villages have been located, several hundred miles of railroad built and equipped, and extensive shipping docks constructed. Most of this work has been done in what was previously an unbroken wilderness.

The annual productions of the leading States may be approximated thus:

| | |
|---|---|
| Michigan and Minnesota | 6,000,000 tons each. |
| Alabama | 2,000,000 tons. |
| Pennsylvania and Virginia, about | 750,000 tons each. |
| Wisconsin and Tennessee | 600,000 tons each. |
| New York and New Jersey | 300,000 tons each. |

Only about 15 per cent. of the iron ore mined is obtained from what may be called small mines—i. e., those producing less than 150 tons per day—and there are a score of mines supplying 1,000 to 2,500 tons each per working day.

The following is the record of the largest output and the total production of a few of the largest producers:

| | Total production to close of 1898. | Largest ouput. | Ouput in 1897. |
|---|---|---|---|
| Cornwall Ore Hills, Pennsylvania | 14,800,000 | 769,020 | 419,468 |
| Lake Superior Mine, Michigan | 8,200,000 | 690,000 | 561,186 |
| Norrie Mine, Michigan | 7,700,000 | 1,000,000 | 561,186 |
| Cleveland Cliffs Mine, Michigan | 7,550,000 | 865,900 | 536,000 |
| Chapin Mine Michigan | 7,200,000 | 742,843 | 354,559 |
| Minnesota Mine, Minnesota | 6,175,000 | 335,318 | 502,738 |
| Republic Mine, Michigan. | 4,700,000 | 277,000 | 124,191 |
| Chandler Mine, Minnesota | 5,110,000 | 914,857 | 586,253 |
| Pittsburg and Lake Angeline Mines, Minnesota | 4,700,000 | 521,100 | 521,100 |
| Iron Mountain, Missouri | 3,400,000 | ..... | none. |
| Mountain Iron and Rathbun Mines, Minnesota | ..... | 773,588 | 775,588 |
| Lone Jack and Missabe Mountain Mines, Minnesota | ..... | 808,291 | 601,072 |
| Alice, Fossil, Redding, Wares and Muscado Mines, Alabama | ..... | 945,805 | 565,395 |
| Fayal Mine, Michigan | ..... | 565,600 | 565,600 |
| Arragon Mine, Michigan. | ..... | 328,000 | ..... |

Instances of native metallic ore being found are few, most of that reported being meteoric iron, really an alloy of iron and nickel. Mexico is quite prolific in large masses of meteoric iron.

The richest ore found is magnetite, which when freed from other elements may contain 72.48 per cent. of metallic iron.

The Lake Champlain mines, New York, most of the New Jersey mines, the Cornwall ore hills of Pennsylvania, the Cranberry mines of North Carolina, are magnetites, but most of them carry sulphur, phosphorus, etc.

Next in order are the red hematites, which when pure may contain 70 per cent. metallic iron. Most of the Lake Superior ores, the Central New York, the fossil ores of Pennsylvania and the Red Mountain ores of Alabama and similar ores in Tennessee are of this class.

When hydrated the red hematites become limonites or brown hematite ores, seldom reaching 50 per cent. of iron. The Salisbury region of Connecticut and East New York, the East Pennsylvania and Cumberland Valley ores of Pennsylvania, most of the Virginia ores and some of the Alabama, Georgia and Tennessee ores are brown hematites.

The carbonate ore forms a fourth general class, from which a maximum of 48.5 per cent. iron is obtainable.

The Hanging Rock region of Ohio and Kentucky, the Mahoning and Shenango Valleys, and some of the Western Pennsylvania and the Maryland iron industry was established upon carbonate ores.

Over 80 per cent. of the ores now used in the United States are red hematites. Only about one-half of 1 per cent. are carbonates; the balance is divided between brown hematites and magnetites in the proportion of about two tons of the former to one ton of the latter.

The slides shown were very interesting and covered the handling of ores from the mine to the blast furnace. The running descriptions furnished by the speaker were very complete and his listeners carried away with them some good ideas as to the immensity of the traffic in ores on land and water before they reach the furnaces.

On the conclusion of the address a hearty vote of thanks was presented to Mr. Birkinbine.

## Pittsburgh Foundrymen's Association.

The December meeting of the Pittsburg Foundrymen's Association was held Tuesday evening, December 27, with about 25 members in attendance. The paper of the evening was by Dr. Wm. B. Phillips on "Yard Grading of Pig Iron." There was a discussion, participated in by Dr. Moldenke, Dr. Phillips and Messrs. E. A. Kebler, I. W. Frank and J. S. Seaman. The opinion expressed by several members that action should be taken looking to greater uniformity in methods and standards of grading pig iron finally took form in a motion. It was generally agreed that chemistry should have a larger place in furnace grading and should be the basis on which iron is bought.

The resolution finally passed was in this form: "Resolved, that the Pittsburg Foundrymen's Association recommends to the American Foundrymen's Association the adoption of standard methods of grading pig iron for foundry purposes, and that our representative be requested to bring this matter before the executive board for action." The Pittsburg district's member of the executive committee is I. W. Frank.

Following is Dr. Phillips' paper:

### THE YARD GRADING OF PIG IRON.

In a curious report made to the King of England, about 260 years ago, on the subject of the manufacture of pig iron, it was stated that there were then made three kinds of iron, to wit, in the original words: "The first sort is gray iron. The second sort is called motley iron, of which one part of the sows or pigs is gray, the other part is white intermixed. The third sort is called white iron; this is almost as white as bell metal, but in the furnace is least fined, and the most terrestrial." The author goes on to say: "I may take occasion here to speak of the nature of cold-share iron, which is so brittle if made of the grain ore, or iron stone would be almost as brittle as some regulus antimonii, made with iron, for with one small blow over an anvil you may break the biggest bar of it, if it be a perfect cold-share iron—nay, the ploughman often breaks his share-point off, if it be made of cold-share iron; but perfect tough malleable iron will not break feasibly in hot or cold, as cold share iron will, or red hot as sulphurous red-share will, but yet tough enough when cold; all of which aforesaid qualities of iron the author well knoweth how to mend their natures, by fining or setting the finery less

transhaw more burrow, which are terms of art, and by altering and pitching the works and plates, the fore-spirit plate, the truiron bottom, back and breast or fore plate, by the altering of which much may be done, if the work be set transhaw and transiring from the blast; the iron is more cold-share, less fined, more to the master's profit, less profitable to him that makes it into manufactorage, and less profitable to him that useth it, but the iron made in a burrow work becometh more tough and serviceable. Yet the nature of all iron-stone is to be considered both in the furnace and in the finery; the sulphureous, arsenical and veneriating qualities, which are oftentimes in iron-stone, to be made to separate in both the works from the fixed and fixing bodies of iron, whose fiery quality is such that he will sooner self-calcine than separate from any sulphureous veneriated quality."

This, gentlemen, is one of the earliest attempts to grade pig iron on the yard. It was in the time of Charles I. and Oliver Cromwell and passed as the most scientific description that had yet appeared. Since that day we have drawn away from the arsenical, veneriating quality of pig iron and have substituted cold-short for cold-share iron, but in other respects the description might be used to-day. If we "set the work transhaw and transiring from the blast" we get certain kinds of iron which the yard-grader knows, by the grace of God, but which may or may not be what is needed at the foundry. If the spirit of Dud Dudley could make the rounds with a pig iron breaker and grader he would feel perfectly at home and would rejoice that the art which he founded in England 260 years ago had not progressed much beyond its original lines. Dudley had three grades of iron—gray, mottled and white. We have 13 grades regularly and as many more as may be necessary to confuse the purchaser.

On the yard and without any help, other than is given by his own experience, the grader distinguishes between the following kinds of iron, to wit: Open silver gray, close silver gray, No. 1 soft, No. 2 soft, No. 1 foundry, No. 2 foundry, No. 3 foundry, No. 4 foundry, gray forge, mottled, white. If he needs other grades he makes them as he goes along, so that instead of being annoyed at the absurdity of the performance, we ought to be thankful that he stops with 13. The first eight are grouped under the term "foundry irons," while gray forge, mottled and white are known as "mill irons."

### VARIOUS GRADES DEFINED.

The grader will tell you that the silvery irons are silvery irons; that they have a fine, silvery luster on the fresh face and are flaky, that they have little or no granulation and are weak in fracture, and that they carry from five to six per cent of silicon. He will tell you that they are the "hottest" irons, "the work being set transhaw and transiring from the blast," and that they contain very little combined carbon, about the only thing at present which is not controlled by a trust, although it certainly is in a combination. He will then go on to tell you that the soft irons begin to show granulation, that the color is light, the face smooth and the fracture weak, and that the silicon is from three to four per cent. They are not as flaky as the silvery irons, nor so jagged as the foundry irons, and the darker color is due to graphitic carbon.

In No. 1 foundry the color is dark, the granulation very open and regular, the crystallization is well marked and the face is rough to the feel. The silicon is from 2.50 to 3.0 per cent, while the proportion of graphitic carbon is considerably larger than in the soft irons. No. 2 foundry differs from No. 1 in having a closer grain and a finer crystallization, the color may be as dark as No. 1, but there is lacking a blackish-gray, velvety color which is always present in the other grade. The silicon may be from 2.25 to 2.50 per cent. And so on with No. 3 and No. 4 foundry, these containing respectively, 2.0 to 2.25 and 1.75 to 2.0 per cent of silicon. Gray forge contains from 1.50 to 1.75 per cent of silicon and has a pebbled granulation in the center, with mottled edges. The face is blistered and pitted and is often honey-combed. Mottled iron has from 1.25 to 1.50 per cent of silicon, no granulation, and shows a pepper-and-salt appearance on the fresh face. White iron has no granulation at all and is often as white as bleached linen, but is not silvery.

After some years of intimate conection with this system of grading, I have reached the conclusion that, as a rule, the graders are very conscientious in applying the knowledge gained on the yard and that no better results can be expected under any exclusively yard system than are found at present. The objection to the system is that it is radically wrong in principle, not in ad-

ministration. Given the principles now governing it and it will be found that they are faithfully carried out. The question is not whether better results can be had under the present system, but whether the present system is not wrong. It is granted that the present grading is carried out as well as it can be, but this is no more than saying that the wooden plough with a yearling at the one end and a stripling at the other does as well as can be expected. The wooden plough may only scratch the surface, but this is all that it is expected to do, and those who would sub-soil with it are destined to many disappointments. So it is with the system of yard-grading now in use; it does as well as can be expected of it.

The tendency of the trade is now strongly towards a closer chemical inspection of the irons offered for sale; and the grader who intends to keep up with his profession must take this fact into consideration. He must acquaint himself with the effect of the chief constituents upon the various irons in respect of color, granulation, fracture and face. He is called upon to decide questions involving a great deal of money, and as it may happen that he cannot wait for an analysis he must be prepared to grade without it. He should, by all means, cultivate the closest intimacy with the laboratory, have the various grades analyzed as often as possible, and not neglect to inform himself as to the influence of the burden, heat and pressure upon the product under his care. But when this is done and after he has repeatedly standardized his eyes it is impossible for him to grade accurately unless the furnace is running uniformly. It is in this respect that furnaces so situated as to be able to buy large stocks ahead and run for months on almost the same ore, fuel and stone possess many advantages over those that live, so to speak, from hand to mouth, and take what they can get.

### LOWER SILICON THE RULE.

Let us take a district in which is produced about one-third of the foundry, pipe and mill irons made in the United States. I do not speak of the steel trade at all, for the system of grading irons for steel making is altogether different. Any one at all familiar with the district referred to knows that it has become difficult to make soft irons there. The old analyses of 4.50, 5.0 and 5.50 silicon are rare, the silvery irons are conspicuous by their absence, while No. 2 soft has dropped back into the position formerly occupied by No. 1 soft; and No. 1 soft is often found with the silicon of No. 3 foundry. The irons that formerly carried from three to five per cent of silicon now carry from two to three per cent, and this too without having suffered any notable change in appearance. Perhaps it would be fairer to say that the changes in appearance by which the grader is guided are not of such a nature as to enable him to seize upon and use for his purposes. Be the explanation what it may, the conscientious grader is brought to face this practical difficulty—the former high silicon irons have changed their composition without having changed their appearance correspondingly. An iron that looks like a No. 2 soft, or a No. 1 soft, and which, according to ordinary yard grading, would be classed as such, is found to contain less than 2.50 per cent of silicon, and may contain only 2.0 per cent. The writer has known instances where a certain iron, graded by two competent men as soft, really had less than two per cent of silicon, and could not have been sold as soft iron.

In a certain district in this country, it was stated by the manager of the furnaces 10 years ago that No. 1 foundry carried 3.66 per cent of silicon, No. 1 mill, which was also known as No. 3 foundry, carried 2.87, and No. 2 C (a silvery iron), as much as 7.09. In this same district there has been a complete change in the composition of the irons and yet the same absurd system of nomenclature is employed without regard to the fact that it no longer applies. Ordinarily and when grading from the same furnace running on about the same burden, etc., the competent grader comes very near the proper grade, and may be trusted to ship on his own judgment. But when complaints arise, and we are all familiar with this phase of the perversity of human nature, the consumer must be shown that the iron that he objected to as not being No. 3 foundry, for instance, does really contain from 1.75 to 2 per cent of silicon, irrespective of its appearance. This much as to silicon. But how is it when it comes to graphitic and combined carbon? Is the iron to be graded solely by its silicon content? It is granted that, for the most part, iron can be fairly well graded on its content of silicon, and that this element confers upon the iron peculiarities of color, granulation, fracture

and face that are more strongly marked than peculiarities due to other ingredients. It is this fact that has rendered possible the present system of visual and tactual grading. It was quietly assumed that if the silicon was all right the iron was all right, and, as it is a poor rule that will not work both ways, if the iron was all right the silicon was all right.

### SILICON THE BASIS.

The easiest way of grading iron is by its silicon content, but it by no means follows that it is the best way. Disregarding the content of sulphur, as not seriously affecting any of the grades above gray forge, it seems to me that there should be certain ratios established between silicon and combined carbon, or between silicon and graphitic carbon, for the soft and foundry irons. The variation in the amount of silicon does, of course, influence the quality of the iron, and one might go even further and say it influences the iron more than any other single ingredient. But combined carbon is by no means to be neglected. In 29 complete analyses of iron graded as No. 3 foundry, the writer found that the silicon varied from 1.45 to 3.83, the average being 2.37. Five of the samples should have been graded as No. 1 soft, as the silicon was between 3.04 and 3.17, and one should have been No. 2 soft, with silicon 3.83. These irons were all graded on the yard by a careful and competent man, yet in six cases out of 29, or 20.7 per cent, the iron graded as No. 3 foundry was really soft iron. Excluding these six, the average silicon in the other 23 was 2.16 per cent, a result not far wrong, as No. 3 foundry may contain from 1.90 to 2.20 per cent silicon. Now, in the six cases that gave silicon much above the normal amount for No. 3 foundry iron, the combined corbon was over one per cent, while in the irons that could have been shipped as No. 3 foundry, the combined carbon was about 0.85. The combined carbon in No. 3 foundry does not usually run as high as 0.85, the average being about 0.40, and in the soft irons it should not exceed 0.40 per cent. But when the soft iron resemble in appearance the foundry irons it will generally be found that the combined carbon is high. We have then to discriminate between soft irons with over three per cent of silicon and the normal amount of combined carbon, and irons which contain over three per cent of silicon and over one per cent of combined carbon. Grading on fracture and appearance, some of these latter irons would be put in No. 3 foundry; grading on silicon content they would go into soft iron, with the understanding that the combined carbon was abnormally high.

The same principle holds good with respect to the other foundry irons, although in a less degree. It is the tendency of the lower grades of foundry irons to show a higher percentage of combined carbon than is usually the case that renders grading by fracture, etc., uncertain. In case of doubt, a silicon estimation will enable one to decide whether or no the iron should be put in the soft grades, and an estimation of combined carbon would decide whether or no it should be stated that this element is above the average.

The purpose to which pig iron is put depends absolutely upon its composition; the color, fracture, granulation, and face have nothing to do with it except in so far as they indicate the existence of certain ingredients in certain quantities, whose actual amounts can be determined only by the chemist. As regards grading on the yard, the inferences to be drawn are reliable only if confirmed in the laboratory, and the sole question is whether or no chemical composition so affects the physical appearance of pig iron as to enable us to grade it without recourse to the chemist. Now, it is conceded that with uniform stock and uniform practice at the furnace a good grader will come very near to the chemical composition. We may allow that he comes sufficiently near for the difference not to be appreciable when the iron is used in the mill, the foundry and the pipe works. But fully one-third of the iron for such purposes is made under conditions that do not allow of uniform stock, and without uniform stock there cannot be uniform practice, and we are compelled to fall back upon the laboratory.

Furthermore, I am convinced that if foundries would pay more attention to the composition of the irons they buy there would be less complaint in the trade generally. We are coming to understand that there may be and often is a wide variation in the composition of foundry irons, and that when a shipment is purchased as foundry iron there may be all sorts of things in it. Many curious discrepancies in the results from using so-called foundry irons are due to the fact that there was nothing known about the

iron in the first place except that it was foundry iron, and the term is a very illusive one.

### PROPOSED IMPROVEMENTS IN GRADING.

What changes are to be suggested by which not only the sale but also the use of pig iron could be largely helped? The present system is open to such an array of objections that it does not seem to be necessary to discuss it further. But if it is to be changed what form should it assume? Almost any one can tear down a structure, but unless he has something to suggest in place of it he cannot be said to have done much good.

I would suggest that instead of the present 13 grades, there be used only six and that in grading iron the three elements of silicon, combined carbon and sulphur be used, with the understanding that for certain purposes the phosphorus also be included. These six grades might be as follows:

| | Silicon. | Combined Carbon. | Sulphur. |
|---|---|---|---|
| Silvery irons ..... | 5 to 6 | 0.10 to 0.30 | 0.01 to 0.04 |
| Soft irons ..... | 3 to 5 | 0.20 to 0.60 | 0.01 to 0.05 |
| Foundry irons .... | 2 to 3 | 0.30 to 0.90 | 0.01 to 0.07 |
| Gray forge ..... | 1 to 2 | 0.40 to 1.25 | 0.04 to 0.09 |
| Mottled ..... | 0.6 to 1 | 0.50 to 1.80 | 0.06 to 0.11 |
| White ..... | 0.1 to 0.6 | 1 to 2.50 | 0.08 to 0.30 |

This scheme, or some modification of it in line with its general provisions, would retain the present nomenclature, and bring it into closer accord with laboratory results. It would do away with five grades, which are no more than side-grades at best, and would enable the grader to exercise better judgment on the yard. The rapidity and accuracy with which silicon estimations are now made leaves very little to be desired, and the same may be said of sulphur and combined carbon, for such purposes as are here indicated. The main thing is to make a start in this direction, and the details of the analytical methods to be adopted can be settled afterwards. It is not required that for such material the methods should have the same degree of refinement as is required in the steel trade where the effect of very small variations in the amounts of certain ingredients is strongly marked. We are dealing with a rougher class of material in which there can be allowed a longer swing of the pendulum. In the steel trade it is now recognized that methods of analysis must be based as far as possible upon the nature of the metal under examination. A method which gives good results on crucible steel does not necessarily apply to Bessemer or to open-hearth steel. It would not be a matter of great difficulty to devise methods for the examination of pig iron intended for foundries, or mills or pipe works. If foundrymen generally should make up their minds to purchase pig iron on analysis it would not be long before the producers of this kind of material would have to fall into the plan with a method of examination that would be acceptable.

It is a noteworthy circumstance in connection with this matter that the very kind of iron which some of our Southern friends are basing the highest hopes, basic iron for the manufacture of steel, has been sold from the very beginning on analysis, the specifications being so drawn that a rigid inspection of it was demanded. It has come into use on a large scale, and justly so for, it is an excellent material for its purpose, and the present steel works building near Birmingham, Ala., could never have been undertaken had it not been shown that this kind of iron could be made there. Finding that the trade in foundry, mill and pipe iron was not altogether as much as they wanted, they propose to make steel and to make it from the very iron that has always been sold on analysis. In common with most makers of foundry irons, they have declined to sell foundry iron on analysis, but when they found that they could sell basic iron only on analysis they gladly entered into the business. In other words, the steel men in the country are ahead of the foundrymen in that they can and do get iron on specifications as to composition, and the only reason why the foundrymen have not been able to do this is because they have not demanded it.

### IMPROVEMENT BEGINS AT THE FOUNDRY.

It seems to me that in some respects we have gone at the improvement of foundry practice from the wrong end. We are trying to study the iron after it leaves the foundry, while it is quite as important to study it before it reaches the foundry. A great mass of information has been acquired as to this point and that point in castings, but the foundation of the whole thing is left to take care of itself, and foundry iron is foundry iron, no matter whether the silicon is 3.50 or 1.50 per cent. If some of the attention now being given to castings were given to pig iron before it gets into the castings, I believe we would make great strides to-

wards a better understanding of the art of founding.

Some years ago in connection with the inspection of the regular make of foundry iron at an establishment where I was employed as consulting chemist, the following plan for keeping track of samples was devised. It was used for a long time with the happiest results, but finally fell into disuse because it was impossible to interest the management in the importance of the subject. But while it was used we certainly got to know a great deal more about the iron than was ever known before. We had stout manila envelopes prepared, 3x6 inches in size. On front was printed the following:

..... Company
.....tons of .....Grade
Made.....in No.....Furnace
Sampled..... by.....
(Mark out the word that does not apply.)

| Color. | Fracture | Face |
|---|---|---|
| Light. | Weak. | Smooth. |
| Dark. | Strong. | Pitted. |
| | | Blistered. |

Chilled edge.....
Granulation
Regular
Irregular
Fine.
Medium.
Coarse.

On the back of the envelope was printed a form for recording the burden, heat, pressure of blast and revolutions of the engines corresponding to the pig iron that was sampled. The samples were sent in to the laboratory and analyzed, and a report made to the management, to the furnace superintendent and to the grader on blanks corresponding to the envelopes. In this way a great deal of valuable information was secured at a minimum expenditure of time and labor. The composition of the irons was observed according to the furnace practice, and the original yard-grading was checked by actual results in the laboratory under a system that allowed of very close inspection of the iron.

The envelopes were prepared after many consultations with the chief grader and others interested in the accurate grading of iron for commercial purposes. We recognized the fact that in yard grading it was necessary to take careful note of color, fracture, granulation and face, whether the color was light or dark, the fracture weak or strong, the granulation regular or irregular, and whether fine, medium or coarse under each of these divisions, whether the face was smooth, pitted or blistered, and finally whether there was a chilled edge on the iron or not. After receiving the analysis the grader was in position to know a great deal more about the iron than he could have known before, for he standardized his eyes by actual laboratory returns and in a methodical and scientific manner.

A closer inspection of foundry irons is second in importance to no other consideration that can affect the business. The work on standard test bars is of no greater importance than this and it is earnestly suggested that some steps be taken by this association, and later by the National Association, towards the purchase of foundry iron an analysis.

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## Foundrymen's Reports on Use of Aluminum in Brass and Bronze.

The experiences of brass founders in using aluminum in brass are as variable as the weather. While some founders report great success by the addition of aluminum, others say that even a trace of aluminum spoils their castings. In view of these divergent opinions, it is interesting to note the experience of those founders who have a good word for aluminum.

Edward Zusi, one of the largest founders in Newark, says he would not be without aluminum. A great deal of Mr. Zusi's work is for the metal parts of harness trimmings, and in this work many patterns are run on one gate, and Mr. Zusi finds it a great advantage to use aluminum to give the brass greater fluidity. Another class of work in which this founder has found aluminum to work very satisfactorily is when he is pouring metal "on the flat." By utilizing aluminum, brass castings can be made "on the flat," while without it the flask would have to be put on end. It is Mr. Zusi's experience that the addition of the right proportion of aluminum to brass acts beneficially, except where the brass is to be dipped in acid. In dipped work aluminum does not work well.

Another Newark brass foundry which uses aluminum with success is that of Brabson Brothers. It is the practice of this firm not to put the aluminum into the brass until just before pouring. When the crucible is taken out of the furnace and the molten

metal skimmed, a tiny piece of aluminum is dropped into the pot and thoroughly stirred in. By this means the firm gets the full effect of aluminum. The work of Brabson Brothers is chiefly in hardware specialties, and aluminum is used in the castings to make them sharper and of a firmer texture.

The reason that founders have experienced so much trouble in putting aluminum in their brass is that they put in too large a quantity of the metal. As has been explained in these columns, a piece as big as a pea in a pot of brass containing about one hundred pounds of metal will affect the mixture beneficially. Every brass founder who makes a study of his business soon learns the exact quantities of metals with which he gets good results, and when once this is learned, and the exact proportion fixed, the founder should take pains to always use the correct amounts. In our last issue we spoke of the benefit derived by the Patton Manufacturing Company, of Columbus, Ohio, in putting a quarter of 1 per cent. in No. 3 Government bronze. The best tensile strength of plain Government bronze is 47,000 pounds per square inch, but by the addition of the slight per cent. of aluminum the Patton Company raised this strength up to the average of 53,000 pounds per square inch.

From the experience of the founders mentioned it would seem as if aluminum were a benefit to brass and bronze. At any rate, these founders are of the opinion that the foundrymen who did not get good results from aluminum for their brass are those who do not know how to use the metal. In any event, the quantity of aluminum put into the brass should be very minute, unless the brass founder thoroughly understands aluminum and its alloys, and the effect it has on other metals. As we have frequently pointed out, the best way to introduce aluminum into the brass is in the form of aluminized zinc, the standard mixture for which is 10 per cent. of aluminum and 90 per cent. of zinc.

The Cowles Electric Smelting and Aluminum Company, of Lockport, N. Y., manufacture aluminum alloys of all kinds, and have an aluminum brass of their own make, and speak of its qualities as follows:

"Our list comprises several grades of aluminum brass, made by adding zinc to aluminum bronze. No. 2 aluminum brass is the strongest in this line, and is made by adding one part of zinc to two parts of 5 per cent. aluminum bronze. The strength of this metal is 80,000 pounds to 85,000 per square inch, and its elongation 5 per cent. to 10 per cent. In casting this metal the same precautions should be observed as in the case of 10 per cent. aluminum bronze. The fine effect produced by adding a small percentage of aluminum to ordinary brass is wonderful."—The Aluminum World.

## "That Molding Machine."

Mr. Editor:—I notice an article on molding machines in your October issue. While I am not at all opposed to the use of molding machines, having, in fact, machines of my own invention in successful operation, yet it seems to me that the machine you describe is rather overdrawn as to capacity. You say that one man made 98 half molds in 58 minutes, equal to one piece in a little over a minute! I much doubt that a man could complete 49 molds in 58 minutes. It looks very nice on paper, but let some one put it to a fair test and I believe he would come out at the little end of the horn! It would be impossible for any man to stand the strain. I think it would be much better for the machine maker if he would not make his machines do such incredible things; and there would be far less kicking by the molders when machines are installed in the foundry. Another point: I know it to be true that some men, when they put their machines in the shop, pick out an expert, known to be a hustler, and taffy him up with $8 and cigars, to encourage him to "let out" and make a good record.

Yours truly,

SNOOK.

## Missing Number.

Have you a copy of THE FOUNDRY for January, 1897, that you are willing to dispose of? If so, you would confer a favor by writing to L. P. Breckenridge, care University of Illinois, Urbana, Ill.

We enjoy reading THE FOUNDRY and from it we have got many pointers which have been of great benefit to us.

JAMES ANDERSON & SONS.
Salt Lake City.

In our issue of January the article, "Molding a 30" Check Valve in Loam" was written by Arch. Loudon, and not Landon.

# THE FOUNDRY

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JOHN A. PENTON - - - EDITOR AND MANAGER.
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## Trade Outlook.

The Executive Committee of the Foundrymen's Association, at the meeting, Jan. 4, reported that prospects for the foundry trade were brighter than they have been at the beginning of any year for a long time. Work was said to be plentiful, and payments sure and prompt, though prices, in some lines, are still low.

General reports of the foundry business from various points indicate that the usual holiday dull season has "slipped a cog" this time.

As an indication of what one company thinks of the situation, we notice that the Phoenix Foundry and Manufacturing Company, of Doylestown, Pennsylvania, on Saturday, the 14th of January, restored to their workmen a cut of ten per cent. in their wages made last summer. The company has had a prosperous year's business, and looks forward to still better things in the immediate future. Having found that the cut made last summer, though necessary at the time, was not justified by subsequent developments, they restored wages to the old figure, and refunded to the men the ten per cent., reaching back to the time of the cut! Does anybody suppose that this would have been done if there were not abundant and substantial promise of continued prosperity?

So intimate are the relations of industrial affairs between this country and Europe that a comprehensive view of the situation must take cognizance of conditions there as well as here. In this connection, it is encouraging to note the optimistic tone of the foreign press with regard to the immediate prospects in iron founding. The last monthly report of the Friendly Society of Iron Founders of England, Ireland and Wales, says: "The past year has been one of great prosperity, and we are entering into 1899 with trade still remarkably good, and judging by present appearances, the outlook for the year may be reasonably considered as cheerfully hopeful." The same conditions prevail there in the pig iron industry as are familiar to us in America, viz., the stock is constantly diminishing, and reserve furnaces are being relighted to meet the growing demand.

It has also been pointed out by a prominent European writer that the reason that the United States had recently captured such heavy orders for cast iron pipe and for locomotives was that the foundries there were so crowded with work as to compel them to make a prohibitory price on the work offered, or to stipulate for a length of time for completing the work that could not be entertained. If this is true, and we see no reason to doubt it, it is the most fortunate feature of the whole situation. It is far better to sell to an excessive demand than to sell under aggressive, competitive prices.

The active movement for consolidation and the ease with which industrial stocks are marketed is a strong indication of confidence in the outlook. Men do not clamor for opportunities of investment where there is not a substantial basis upon which to predicate profitable results; and the general impression prevails, and rightly, too, that this is the time for investment in all kinds of manufacturing enterprises.

## Writing on Foundry Practice.

Some time ago we printed an editorial under the caption "Why Don't You Tell It?" That little query bore good fruit, as we know from the fact that several of the writers whose articles have since appeared in THE FOUNDRY mentioned that invitation as being what induced them to submit articles for publication. A man cannot be a first-class molder and a first-class machinist

at the same time; it takes a lifetime to become either one of these. Neither is it expected that a first-class mechanic shall express his ideas on paper as fluently as the practiced writer. But the mechanic is, however, the only man who is competent to impart helpful knowledge about the intricacies of his trade; and every time he does this he becomes more proficient in his power of expression. It gives his mental faculties exercise in an unusual direction, brings him into greater prominence in the estimation of others and of himself, and promotes the solidarity of human society. We, as editors of a trade journal, are not specially hunting for pure literary style, but for mechanical facts. If we get the facts and fail to present them acceptably, that's our lookout.

We are sure that scores of our readers who have never yet "peeped" can give us points in foundry practice that will be welcome reading for all.

When you get this book read through, just take a good, soft lead pencil and sit down and write us something about how you have at some time overcome a difficulty in your work, or as to the method adopted by either yourself or somebody else who has done something in a way that seemed an improvement on the old practice. Do this and we'll send the story back to you in the next issue of THE FOUNDRY.

## Operating at a Loss.

At the meeting of the Foundrymen's Association, Philadelphia, January 4, President P. D. Wanner, in discussing the prices of foundry products, said that: "Pipe foundries have been operated at a loss since 1888, and other lines of foundries are in nearly as bad condition." Anent this question, we have some knowledge of a certain pipe foundry in the State of Tennessee that has evidently made more money since 1888 than it had made in all its previous history. Within the last few years the principal members of the firm have built splendid mansions for themselves, and others for their married children, and, in addition to this, the company erected one of the costliest pipe foundries in existence, with no limit as to modern, up-to-date equipment. This does ont look like operating at a loss.

The concern that we are here writing of was a simple foundry company when all these expenditures were made, but it has since joined the great pipe manufacturers' combine.

When we see people spending immense sums of money we think we may reasonably infer that they are making money. For several years past the pipe foundry industry has been expanding, and more and more capital has been invested therein. Where do they get the money for such investment? We suspect that it comes to them in the shape of profit in their business. No doubt some pipe foundries have lost money in the recent past, but must the public pay an increased price for pipe in order that an ill-managed, or unfortunately situated foundry shall make a profit? Hardly. There are plenty of pipe foundries so situated that they are making a good profit at present prices, and these same concerns are perfectly willing to add to their output all the business that others may reject at prices now prevailing.

There is one circumstance that will justify an advance in price, and only one; that is, an increase in the cost of production.

Viewing broadly the question of cost of production, there is at the present time but one thing that can by any possibility increase it, and that is, an advance in wages. Everything of commercial value, including capital, is a product of land and labor. There can be no increase in the cost of mineral lands at the present time sufficient to cut any figure in the cost of iron production. Therefore, since many pipe foundries have been making a splendid profit during recent years, there will be no justification in increased price of pipe, except to cover an advance in wages, which includes cost of material.

The steadiness of prices in the face of the tremendous expansion of trade for some months past has led to a very widespread belief that manufacturers generally had come at last to recognize the fact that it is not always wise to advance prices even when it is possible to do so. The reason that such an immense product is now being marketed is because the price permits it.

The products of land and labor tend to grow cheaper, with the advance in productive economies. This is a universally recognized fact. When, therefore, we reflect that capital is a product of labor, the hopelessness of any attempt to enhance its value, permanently, under natural conditions, becomes apparent.

As the iron industries are the great, overshadowing factor in modern business affairs, we hope that the men who are at the

head thereof will continue (as they seem to have been doing) to weigh any suggested act by its probable effect upon the future as well as the present.

### Casting Pure Copper.

Ever since electricity came largely into use as a motive force, there has been a large and increasing demand for pure copper, as that metal has much higher conductivity than any other that can be had for the purpose. The fact, however, that it has been impossible to make sound castings from pure copper has addded very much to the cost of electrical machinery. It has been the custom, where pure copper was used, to employ rolled copper, sawing out the shapes needed. Alloys of copper and some other metal, as zinc, or aluminum, have been used in making castings, whose conductivity was generally about 50 per cent. or under (the highest ever reached being but 77½ per cent.), which rendered it extremely unsatisfactory. In view of these facts, the announcement that Mr. B. S. Summers, chief chemist of the Western Electric Company, has discovered a process by which copper castings having a conductivity of an average of upward of 90 per cent. can be made is of sufficient importance to mark an epoch in metallurgy. It is said that in one machine where a casting weighing 3,900 pounds was used, a 2,600 pound casting was substituted. The difference between these in weight is 1,300 pounds; and, with copper at 14 cents per pound, this, in money, is $182.

We hope that the report of Mr. Summers' discovery will be confirmed, for if true, it is of vast import to the world at large as well as to the company employing the process.

### Running Night and Day.

There are, no doubt, lines of manufacture, or, perhaps rather, steps, in many lines of manufacture where running night and day may be practiced as a measure of economy under all circumstances. But it is always to be regretted when circumstances compel night work in the foundry. The very nature of the work is such as to demand good light in order to satisfactory work. And again, the men who work at night must use the same patterns, sand and tools generally that are used by the day gang. Under these circumstances the question, "who made the bad castings?" is often a difficult one to answer. Night-work in the foundry, or in any other line of manufacture where it is not commonly done, is necessitated at a time when workmen are hard to find, and consequently, many concessions have to be made that tend to destroy the morale of the shop, beyond the possibility of easy restoration, to say nothing of the curtailment of profit for the time being.

Of course, circumstances sometimes compel night-work, but the general opinion deduced from experience is that it does not pay in dollars and cents, but only as a means of holding customers; and that it should never be pursued longer than necessary.

### Some Early Western Foundries.

One of the earliest enterprises in the way of manufactures in St. Joseph, Mo., was the foundry established on St. Joseph avenue, 1855, by T. W. Keys. This, with the exception of a small foundry at Lexington, was the first plant of the kind west of St. Louis. The power of his foundry was furnished by oxen.

In 1860-61, Mr. L. B. Putnam was conducting a foundry in the city of Burlington, Wis., and the power supplied was by a horse-power such as few of our readers ever saw. It consisted of a large wooden disc, revolving on an axis, the plane of the disc being at an angle of, perhaps, 15 degrees, so that, when the horse walked on the outer edge of the disc, one quarter round from the lowest point, his weight would press the edge of the disc down heavily upon the friction pulley just under that point, and at the same time cause the disc to revolve. The speed was controlled by a brake.

In the year 1866, a foundry in Manchester, Ia., was supplied with power by an ordinary, one-horse tread-power. This was connected to two small Sturtevant fans, such as is used for a single blacksmith forge, the fans being set close to the cupola on opposite sides thereof. The melting in both of the two latter cases was done with Lehigh coal, and was perfectly successful.

### The "Draw-Off" Was Poured Into a "Puddle."

The General Electric Company started up its immense new foundry at Schnectady, N. Y., early in January, and a Lynn, Mass., "Item" reporter was an eye-witness of the first "heat." There is nothing more enter-

taining to a foundryman than to read the average reporter's description of foundry processes. In this case, the reporter says: "It was about 4 o'clock that the great blower, with which the foundry is equipped, was put on, and it was not long before red-hot particles of iron began to fly out of the trough of the cupola. In the meantime, G. E. Emmons, manager of the Schnectady works, had been receiving his first practical experiences in molding, under the direction of Foreman Mohlmann. The result was that two brand new flasks were made ready for the molten iron. One contained the model of a paper-weight (!) and the other a medal, which Mr. Mohlmann had prepared as a pleasant surprise. This medal contained an appropriate inscription. When the 'draw-off' was ready it was poured into a puddle, and like a veteran Mr. Emmons lugged it to his molds."

The reporter does not say whether there were other molds ready for the iron or not, but we presume there were, as he mentions the hearty applause of a half-hundred employes when Mr. Emmons started to "lug" the "draw-off" in his "puddle" to a third mold that "needed filling."

## A Snap.

By OSCAR OLDMAN.

Not the kind you are looking for, but a snap-flask. The snap-flask was probably the most valuable invention ever devised for foundry use since the adoption of the common flask having two or more parts. It is safe to say that a hundred thousand molds may be made in a single snap-flask before it will be entirely worn out. There will have to be some repairs during this time, no doubt, and there ought to be more frequent repairs than are generally given it.

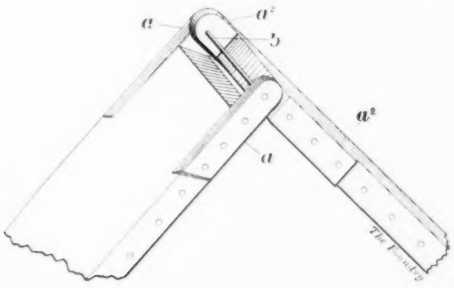
The old saying, "Give him an inch and he'll take an ell" expressed a recognition of a pronounced quality of human nature. Few people of to-day know what an ell is; but they know what is meant when you say, "He wants the earth with a barbed wire fence around it," which is more modern, and means about the same thing. The snap-flask, costing two or three dollars, may save the founder fifty or a hundred dollars, and yet, though the expense for repairs to keep it in perfect order would be but slight, few foundrymen will make the outlay in time to get the highest benefit therefrom. No doubt, there are exceptions to the rule, yet, though the writer has worked in something more than a score of different foundries, he never ran up against one of them. The fault does not lie with the foundry foreman; neither does it attach to the molder; for, the molder never fails to kick at a poor flask. The foreman, being an ex-molder himself, recognizes the justice of the kick, and reports the situation to the superintendent, with a request to have the flask repaired. But, the other departments are too busy. "Can't you get along with it for a day or two?" And, of course, you can—few things are impossible to the foundryman! Meantime, the flask is loose at the hinge and at the snap lock, and every time the cope is lifted the center sags, the mold cracks, and every now and then a fall-out results. The molder is no angel. We have heard him assert it, and besides, we have had other evidence of the fact. So, when one of those drop-outs occurs for, say, the eighth or tenth time within a half day, he looks round the shop, and, if the foreman is not in sight, he smashes the flask down upon the floor with an exclamation that has been plugging up his throat for a good while, and when it flies out, it permits the escape of a good deal of feeling that leaves a sense of relief! But the flask has not been improved! And now the molder hurriedly takes the repairing business into his own hands, and he drives a lot of nails into the ends that form the joint, so as to make the snap lock draw more tightly, and incidentally he splits the wood, and, altogether renders the final repairing of the flask thrice difficult.

Another fault with the flask is that the heads of the screws that held the irons on the top edge had become worn out and the irons had fallen off and the strike was wearing ditches in the top of the flask that rendered a level surface to the cope impossible, with the result that many molds run out and castings strain. All this bears hard on the molder, and he feels a resentment that is bad for his employer, whatever it may be to himself.

The only right course to pursue in this matter is to repair a snap-flask instantly the occasion arises for it. But not one foundry in a hundred has the facilities at hand for the purpose when needed. There ought to be kept constantly in stock hinges, snap locks, and irons for top and bottom, drilled, reamed and ready for instant use.

The style of hinge is a very important matter, most of the hinges now in use being totally unfit for the purpose. There is a great strain upon the hinge, and if there is any play, or want of rigidity, the effect is bad in more than one way.

Almost any hinge is a good hinge when it is new, but there is only one kind of hinge that is really fit for use on a snap-flask, and that is the one shown in the illustration. It will wear longer, without becoming loose, than any other, simply because the bearings are wider apart, and when it becomes worn so as not to hold the flask rigid, simply enlarge the holes a trifle and put in a rivet bolt to fit. It will be seen that one rivet bolt passes through all the hinge pieces, a, a, a2, a2. This is of the highest importance, because, if two short rivets be used,




one in each pair of hinge pieces, they will wear out much more rapidly, and when worn a very little they will incline, in the direction of strain, from the perpendicular, and so make a loose, wabbly, no account joint; whereas, if the rivet (b) extend through both pairs of hinge pieces, the leverage against strain will be immensely greater, and the life of the hinge will be correspondingly lengthened.

Another point about this joint that I wish to call particular attention to is, the square ends of the wood pieces. A flask with a close-fitting mitre joint soon gets out of order, because the sand gets into the joint, and so, when the flask is shut and locked, there is a tremendous strain on the hinges, and the screws become loose, and any amount of trouble ensues.

But, with such a joint as shown here there is no chance for any such thing.

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"We desire to commend THE FOUNDRY for its progressiveness in the treatment of foundry matters."

D. H. HANSELL.
Philadelphia, Pa.

## Foundry Fixtures.

### CAST IRON FLASKS, ETC.

By R. D. MOORE.

Correct proportionment of small iron flasks that are to be in daily use for years is of great importance; not only the frame-work but the pins and handles all require the closest study and the nicest judgment

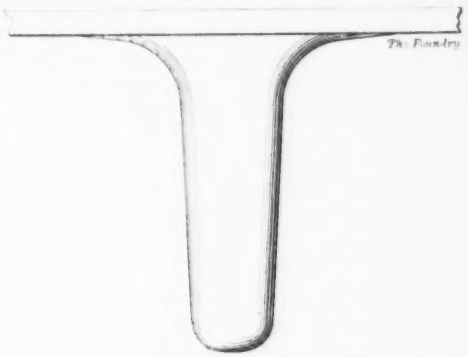


*Fig. 1*

in order to hit the right proportions to secure the greatest durability with the least material to handle.

I have seen handles over two inches in diameter and scarcely two and a half inches long that were durable, but they reminded one of the old saying, "By main strength and awkwardness." Less iron would make a handle that would reach through the hand and by its elasticity reduce the breaking

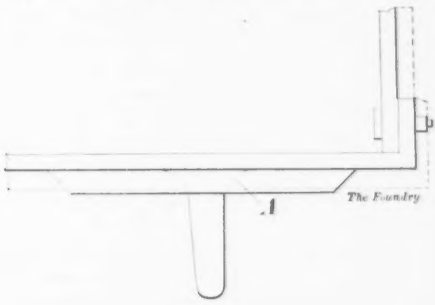


*Fig. 2*

strain of a blow on both flask and handle. (See Fig. 1.)

I had charge of a certain foundry in a Western city the last year of the company's existence, where I found a lot of jobbing flasks that whould take the premium for blunders.

The deceased foreman had gone through a long and very creditable foremanship, hav-

ing made the work for some of the finest Western steamboats, water works, and other good jobs of that day.

But it was not till he attempted the apparently much more simple task of designing small iron jobbing flasks that we discover his weak point.

The flasks were 20 inches square, 7 inches deep, each part, and made of four plates ¼ inch thick, bolted at the corners, and with outside stiffening ribs at the outer edges, ⅜-inch thick, by ½ inch wide (see Fig. 2), the dotted lines showing the ribs. Thus far the design was a fairly good one, but the design of the handle is "the rock on which his galley split," completely spoiling an otherwise good job. At the seat of the handle he added a ½-inch slab, 3½ inches wide by 6 inches long, under the impression that it would be a strengthening devise; exactly contrary to true reasoning.

The slab adds shrinkage strain to the end plates, besides the still greater damage of giving much rigidity at the base of the handle, whereas, the elasticity of the plates is

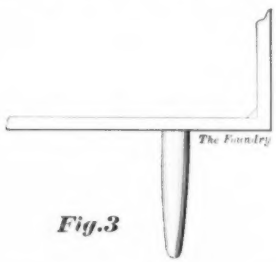


*Fig.3*

a very important provision against the breaking force of a blow. If this addition were all removed except a fillet, as shown by the dotted lines at A, Fig. 2, the most durable handle which that amount of iron can give would be secured, as seen in Fig. 1; with a reduction of weight of about 12 lbs. to handle on each piece of flask; which is an important consideration.

When I was introduced to that interesting flask pile there remained intact about one handle on each piece. That half-inch rib on the top of the cope made it possible to handle them, but it was severe on the fingers, and they should have gone to the hospital for new handles.

My impression is that our late foreman got his design for this handle from Fred Overman, a mining engineer, author of "Founders' Guide," extensively published for nearly fifty years past; a large waste of paper and printers' ink. It should not be expected that an engineer, a mere visitor in a foundry, could give much instruction to a molder in his handicraft; but a flask handle design, for economy of material and strength, is in the engineer's special department, and we might reasonably look for a better design from him than four inches sawed off from a broom stick! (See Fig. 3.)

Another sample handle:—I succeeded for a long term of 19 years an energetic, driving, money-making foundry foreman, who had in the early part of his career gotten up a lot of 16-inch iron flasks with wrought iron pins, like Fig. 4, that had nearly all gone to the scrap pile when I took hold.

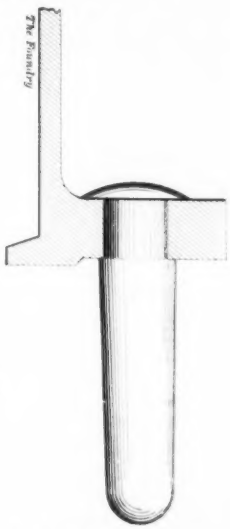


*Fig. 4.*

He had evidently condemned cast flasks and stopped renewing them. Their weak point was at the base of the handle, for, instead of looking to nature's works for a guide, the faultless proportions of a tree limb, which breaks at all points, having no weak places, he reversed the graceful contour of the limb at the butt by setting his dividers on the wrong side of his line, making a hump, or collar—see Fig. 5—where there should be a concave shape, as shown by dotted lines.

If all the limbs of a tree were clamped in a rigid vice, at almost any point, a severe gale would strip the tree; simply because the elasticity of the perfect limb which defeats the blow or force, is suddenly terminated at the clamps; in like manner these two handles, though fairly made otherwise, suddenly terminate in a rigid block, especially Fig. 2, and failure will necessarily follow all such mistakes in their contour.

Gen. Sherman once remarked to a group of friends: "Gen. Grant and I differ in our tactics in the field; Grant never bothered his head about what the enemy was doing; but what the enemy is doing scares me like hell."

I also asknowledge that when designing flask handles and pins, with hard knocks in prospect, the contemplation of leverage and rigidity combined makes me tremble.

A Durable Handle.—Fig. 1 presents a handle that has shown great durability under rough usage on a set of flasks in frequent use for nearly 20 years. One handle only was broken, by a careless helper throwing a heavy cast bar upon it. These three handles shown were all very nearly alike in length and diameter, though differing so greatly in their ability to stand the strain of rough usage, the result of an injudicious

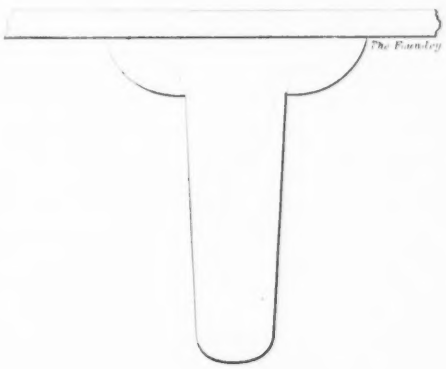


*Fig.5*

addition for strengthening the parts. Fig. 1 is sketched exactly half size, which its record would fully justify.

Flask Pins.—Cast solid on the flask are seldom found both durable and satisfactory. The shape of the pin is still more important than that of handles, being a more delicate and indispensable part of the flask.

Fig. 6 presents a V-shaped pin that has given great satisfaction in connection with the handles described above.

This sketch is also given half size, for convenience of copying. It requires great strength at the root and should be increased rather than diminished for greatest efficiency.

If broken off a sufficient seat is left to tap in a wrought pin, which is durable if shaped as at Fig. 7, that is, the pin must follow the rule for securing elasticity; the taper should begin a little below the size at the bottom of the thread or it will fail.

It is also advisable to favor the strength by making them short; not over 2½ inches long.

I tried "melting on" three pins by making an open mold at the break, it requiring 150 pounds of hot iron to get a good weld; the overflow iron was caught in a ladle and used, in pouring other work, but, although successful, my impressions are in favor of the wrought iron pin, if you can catch a machine shop "cub" out of a job.

These breaks occurred with a pin weaker at the root than the one shown, but afterward increased to this size.

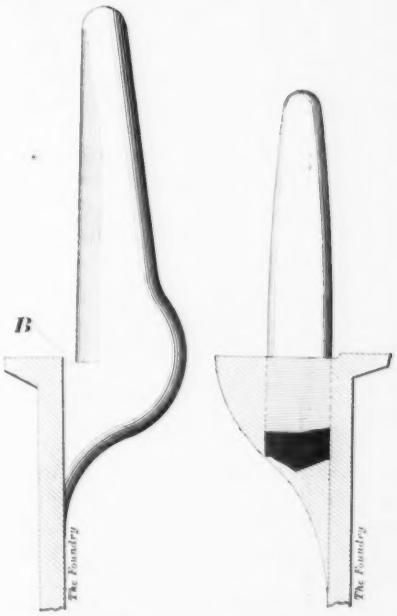


*Fig.6* *Fig.7*

Nothing short of a carefully devised system rigidly carried out will give a satisfactory lot of interchangeable flasks, and no other should be considered for a moment for small sizes. The V-shaped pin (Fig. 6) should stand off ¼" from the drag for irregular handling, and the shoulder should be set ⅛" below the joint, as shown at B, to avoid rocking on sand particles that may be left there.

Fig 8 presents the drag with the V-shaped pin-seat, the shaded section being of hardwood fitted into the same dovetails that carries the pin pattern, the dotted lines D showing the outline of pin when set.

The system adopted for making them interchangeable was: casting six copes at

three heats, then after smoothing the pins with a file, fitting a notched stick to the widest apart pins, that stick becoming a guage, or templet, to fit all future copes to; the next move was to make another guage stick with pins fitted to the first stick to fit the drags by. A little adjustment to a few mate-parts is also generally found necessary, after fitting to the templets.

Every drag was cast with pin seats on the bottom edge also, and every cope with the same on the top side, and they were found very convenient for "three parts," and deep, molds. A few pieces of flasks increased in depth, and others reduced, were found to be well worth the trouble of making them, for shieves and other jobbing.

The pins were all set two inches out of center of flask, thus preventing them from coming together in shallow "three-parts," and insuring against a wrong "close."

Fig. 4 presents a riveted pin much in use, but, although made of ¾-inch iron, will be

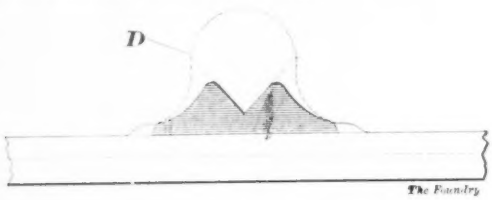


*Fig.8*

found much weaker than Fig. 7, made of ⅝-inch iron, because the rule for elasticity is violated; that is, it is weakened by the reduction at the shoulder, where it should be the strongest.

In proof that I am not exaggerating the effect of elasticity in defeating a blow, or force, the experts tell us that a strong man wielding a heavy sledge will strike a blow on a slab of cold iron equal to 14,000 lbs., barely leaving a mark, but that if the slab were heated enough to receive a dent 1-10 inch deep, the force of the blow would be qual to only 1,400 lbs.

What has become of 9-10 of the force of that blow? It appears to have been defeated by the "give" of the soft metal.

Our every day life is full of examples in point; lay your hand on a soft cotton bale and strike it with a heavy hammer, harmlessly; but, lay your hand on an anvil, and that blow would crush the bones, simply because part of the elasticity in the case was removed.

Again, hang an old rotten carpet on a line and you can beat it with a yard stick without damage, but let one of those blows fall across your dining table and every dish touched will have "gone to smash," although possessing immensely greater strength than the carpet; the result being determined by the high degree of elasticity in the carpet and the extremely low degree in the dishes.

### A PECULIAR PIN.

Just "after the war" I was called to a shop where house work was a leading feature, including the cast iron lintels which spanned the store fronts of that day; that casting being rough, it was faced by a smooth, plain plate, hung on the linter box by hooks cast on the back of plate.

These plates were, say, 20 inches wide and with lengths reaching over 20 feet, all extra lengths being made in two pieces. That 30-inch cope, 25 feet long, required a large gang to handle it, the extra help being called in from the other departments.

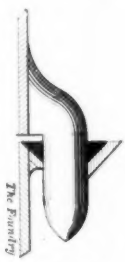


*Fig.9*

At the first "close" that I witnessed, both ends of the cope were down while the center pin rested on the plate, 4 inches high; the cope was then raised again and held until the center pin was finally entered, when a proper close was effected.

Such a gang of indifferent men is very hard to control in entering the centre pin, the ends being much easier. The cope stood that immense twist without a drop, which I regard as extraordinary.

This trouble had been going on for years, with no attempt to correct it, which made "Jo" stare when I assured him that it should not occur again. Going immediately to the pattern shop and getting a "cub" to turn the pin, and the dished plate shown in Fig. 9, I attached them to the ⅜-inch plates shown, 4 inches, by 8 inches long, and screwed them to the outside of the flask, with six stout screws in each plate.

This pin was 1½ inches in diamater, which, added to the dish around the pin

hole, causes the pin to enter, even if about 1½ inches out of its true position, and it never required any attention during years of service, "Jo" evidently regarding it as one of the great inventions of that age!

### Chimmie Powers in St. Louis.

Chimmie sauntered into "Molder's Rest," pushed his hat back, and said, "Put a nickel's wort in de tin," as he pushed it across the bar, and he with the white apron held it under while you could count three; "S-a-y does a spy-glass go whit dis; why de top of de growler don't know dat de bottom is moist: De war tax? Sa-y don't you read de poipers, don't you know de war's over? didn't you hear 'bout de Pleece commissioners over in France signin' de treaties ov piece? You look like Weyler to me, and y'u can't fill me up whit hot air that way; put anoder squirt in dis pan o' suds, or I'll pull a six-inch gun on you, I'm drinkin' am I? well dats no dream, and its your biz t' feed me on drink 's long's I cough up de dough; didn't I put down my good coin fur dis? S-a-y you'r breakin in t' jail, an you'll have t' treat me square, if y'u want t' hold my trade, see. Mi defens is dat las' night I drew me pay, an a gang o' mi frens led me 'round frum one sloon to 'nothe, whit mi change in mi han, blowin miself, an dis mornin' wen I woke up, foun' out dat I wus in bed wid me shoes on, an a blaze wus comin' outa me mout, an now I'm tryin t' suber up, an you' tryin' t' gimme de hooks wid yer snide measure; s-a-y you musta thought I ast fer a tickets wort, didn't y'u? What did I get fer Christmas? Well I got plenty uv eggnogs, an me goirl sent me a box uv ropes, an she sent dem by her kid brudder, de one which I got outa jail, dey smoke like punk, an de mout is nearly burnt outa me from dem, guess I'll sen dem t' Havana t' fumigate de streets. Am I workin? Why soitenly, over in Granite City; Mr. McRoberts is de main squeese, an Marshal Owens is de gaffer, Bob Allison is in de front row there, an all uv Todds ole gang is der 'cept Coldsprings, an I hear he's studyin medicin in a colleg, but I'm layin' off now an expect t' get de roolers put under me wen I go back. I see ole man Cunningham's left Dutroes, an I hear hes gointa start a cigar stand, an sell postage stamps at cost, dey tell me dat Pat Leonard tried t' join de volenteers las' summer, well s-a-y; if y' wus t' shoot a gun of near him it'd scare de life outa him. I wus down at de Stan'ard Theatre one night las' week, an I seen Mike McKenna an s-a-y y' out t' seen him laf an clap his mits when a goil come out ta dance wid short dresses on, s-a-y hes a friend uv mine, an he broke his pledge onct by fallin' down stairs, but he hardly ever gets his trolley crost, but he always loafs on a Sheeney Holiday. Yes I was at the ball de oder night, an I done a twist wid "Skinney" Marvins dame two times, an "Skeet" Walker gimme a "Hunch" dat Skinney was gointa trow de hoof in t' me fur bein so friendly wid her, so I pulled mi freight sooner den t' make a rough house. Well s' long fellers I'll haveta duck out an use dis beverage on mi thirst 'fore it gets flat."

S. E. ATTLE.

### Reflections, Recollections, Objections and Corrections.

By C. RITIC.

Having worked in a foundry recently where some unusually funny things were practiced without objection by the foreman, a little reflection may not be out of place. The foreman was a graduate of one of the Bass Car and Foundry Company's shops, and had probably seen a few coke beds used in his time, but never saw one dug out after being used; but the shop in question did a class of work that required those beds very often, and no one ever dug them out, because he never insisted on having it done; consequently, there was a net-work of coke beds under the whole sweep of one large crane. One day there was a column put in the floor, about eighteen feet long. Two molders worked on it all day, and when closed and weighted down, and all the other heavy floor work around it was cast, and the big ladle was under for the column, about twenty men, mostly laborers, were seated on the flask, or weights; some fellow "caught over" a hand ladle full, and in passing the column he spilled about a spoonful of the metal; it splashed, and some went in one of the runners. The result was an explosion, a loud report, and it lifted the cope, weights, men and all, some say, two inches off the floor, and to use the language of the street, it didn't do a thing to the mold but tear it all to pieces!

I recollect a trick, and a good one, too. A partner of mine was a great hand to attend to the stove back of our floors; he was

handicapped, though, by the fellows, one in particular, that used to come from the other end of the shop and take the "ash shaker," and he was kept busy at times making new ones, because the other fellows never brought it back, and it was invariably lost. One evening I saw him cast one with first iron. He shook it out, got a pair of tongs, tapped the sand off of it, cleaned out the square hole that fits on the grate, took a hammer and tapped it on the square projection, and a couple of days later I saw the fellow from the other end rush up, grab hold of the one on our stove; but he didn't take it! It was shrunk on good and tight!

I object to the practice of some foremen in putting laborers on the floor. Having seen this done recently, I was convinced that the foreman didn't keep posted on current events, by reading foundry literature, and proceedings of different foundrymen's associations, and how they are trying to solve the apprentice question, and raise the standard of American molders. I was a witness to two helpers being put on the floor a couple of years ago. Of course, I didn't blame the helpers, but no organization existed in the shop, and the deal went through. The molders all seemed indifferent as to what was taking place among them, but the good thing about it was, 'twas a boomerang, and acted as such. The foreman lost out, as did all of us, by the company retiring from business; and don't be surprised when I say that the two helpers are working on the floor, in the same shop where the ex-foreman is employed, thus competing with him for a day's wages and work, and who knows but that the day will come when the two helpers will be at work, when the ex-foreman will be standing at the gate looking for a job? One way to correct this evil is for foremen to learn how to use, and not abuse, the "authority" vested in them, as there is no certainty as to the length of time they will be permitted to wear the shoulder-straps themselves.

## Another Way.

Editor THE FOUNDRY:

I noticed in the December issue of THE FOUNDRY, Mr. Wm. F. Korkem's ingenious method of finding the weight of a cast iron plate 1 inch thick, and of any diameter. Apropos, I have employed a short cut to the same end for eighteen years past, and my method gets a more nearly correct answer, as may be seen by the following example:

$$
\begin{array}{r}
32 \\
32 \\
\hline
64 \\
96 \\
\hline
1024 \\
\cdot 20^2 \\
\hline
20480 \\
512 \\
\hline
\end{array}
$$

209.92 weight.

WM. Y. CRUIKSHANK.

## How to Become a Foundry Foreman.

By C. RITIC.

THE FOUNDRY has containend a number of articles on the above topic recently, and perhaps another one or two will not be out of place. The writer has worked for many varieties of the genus, including the Bulldozer, the Driver, the Ignoramus and the Gentleman, and in most cases has known individual molders working for them who could "lose" them in the sand heap, and puzzle them in the construction of flasks, and who were in many other ways the foreman's superior. But the class commonly known as "scalawags" are always looking for positions, and, though seldom able to hold the place long, they get the preference nine times out of ten.

A foreman once remarked to the writer, "If you don't know anything, make people believe you do, anyway!" But that does not go now; and I advise the seeker after a foremanship, if he knows anything, to keep still about it, and your promotion will be the more certain. Look about you and you will see that this is generally true.

I have in mind a certain St. Louis foundry that has been running for over thirty years, and during that time only four different men have had charge; the last one, after fifteen years of service in that capacity being still in charge. The proprietor died a few years ago, a millionaire. His foremen were all first class mechanics, and treated their men with impartial courtesy, and maintained strict, though not severe, discipline.

Contrast this with another fouundry of that city, that in fifteen years of life employed ten different foremen; they were of all grades of character and disposition. One had the habit of going to sleep behind

a pile of flasks after giving out the work in the morning, and also, for a spell in the afternoon, having made arrangements with someone to awaken him in case anybody should come in; but somebody "rubbered," and he was fired; another spent most of his time in a neighboring saloon, paying occasional visits to the foundry. Another of this bright list of foremen would dump a complicated pattern on your sand heap and leave you to hunt for a flask. Perhaps you would find one suited to the job after turning over most of the stock in the yard, digging it out of the frozen ground; then, the carpenter would, likely, have to do an hour's work on it, besides having to make a new bottomboard for it, etc.; and it might be 9 or 10 o'clock before you could get fairly at molding. Then, after working hard and conscientiously all day, getting the mold ready for the cores at the last end of the heat, behold—the cores had been forgotten! Columns could be written of just such misfit foremen who were employed in this foundry. It was, at times, a good place for the molders, but it was well understood that the firm was being Jonahed right along by its foreman (?), some of whom could not make a button for a barn door. Recently the inevitable transpired, the red flag was hung out and the auction is a thing of the past. In conclusion, it seems to me that the best policy is to get the best man procurable, no matter what the price, and to avoid the "gold brick" at any price.

To those who would be foremen, I would say, use your judgment, see that no molder has to wait for cores, flasks or other facilities; don't let a man cover up a coke-bed to save time, for it will cost time on a subsequent occasion when you have it not to spare. Above all, have no favorites; and if a man is not wanted, tell him so plainly, and let him go—don't smoke him out! for such conduct breeds discontent and demoralization.

## Some English Methods of Making Rope Pulleys.

By H. SAYERS.

The old-fashioned way of making rope pulleys, as practiced in England, is to make the grooves in dry sand segment cores, and the arms in green sand cores, setting all on a level bed and covering with a flat cope. This crude practice still prevails in many shops.

A better way is to ram up the rim to a 1-foot section of pattern set to a mark scribed on the bed. In this case, greater care is necessary in setting the arm cores. In this latter operation it is usual to strike a line from center to circumference, set the edge of the first arm core thereby, which will act as a guide for setting the next, and so on to the end. The last core set should have about an inch shaved from the sides to insure its going to place without friction, any space left being filled up afterwards. The top may be covered by a flat green sand cope, or by loam plates.

But the best way of all is to sweep the grooves in loam, on a ring. This should be done on a carriage having a sweep spindle in the center, so as to avoid handling till after it is dried. Set the arm cores in place on a level bed first, and then lower the loam ring down to position, covering with a flat green sand cope, or with loam plates.

The above are English practices, and are published in THE FOUNDRY in hope that some one of your readers may tell us of something better.

## What is a Good Pattern? and, How Wood Changes Its Shape.

By JOHN M. RICHARDSON.

After coming in direct contact with patternmaking during the past fifteen years, I am more and more convinced that the answer to the above question is one that the molder would give, namely: "One that will draw easily, and not break the mold." Now this feature is just the one that the world at large hardly considers at all in replying to the query, and in nine cases out of ten the pattern that has been scoured the smoothest with No. 0 sandpaper, and presents the highest gloss on its surface after being shellaced, is the one that will get the credit of being the best pattern, and the man that made it, the finest workman as well. This is decidedly wrong; a pattern is simply a means for an end (this last sentence would easily bear repeating), and whoever can best fulfil the conditions implied by it, is the best patternmaker, and his patterns will be the best patterns.

If the end sought is a large number of uniform castings on standard work, then, by all means, spare neither time nor expense to have the pattern constructed in the best pos-

sible manner, smoothly sandpapered and carefully varnished, for the end in view is permanency, and perfection in molding as the highest attainable result is sought with regard to the casting.

An old employer once said to me: "It is just as bad to do anything too well as not to do it well enough; it wants to be done as well as it needs to be done." And, working on this principle, it is a good deal like filching money out of someone's pocket to fuss and putter and be over-exact and nice on some cheap job where only one casting is required. On this kind of work, if it is rather coarse and only blacked and sandpapered once, the resulting casting will be just as good, and the pattern will still be a good one in the sight of the molder if it draws well, as every pattern, however cheaply made, should do, for back draft is an absolutely inexcusable fault, and absolutely intolerable.

A cheap pattern can have its name verified by the method of its construction, and also the amount of labor spent in finishing, but dimensions must not be slighted. Where only one casting is wanted it is usually made of one piece as nearly as possible, for the wood will not have time to change its shape to any extent if put directly into the sand, but if it remains long subject to moisture and atmospheric changes, it will become much distorted, and oftentimes unfit for further foundry use.

This is the one great drawback to wood, it will not "stay put," as we say, and every means has to be devised when making standard patterns to so construct them as to withstand the varying conditions they will meet, and prevent the three great foes—warping, shrinking and swelling.

This can be better understood when we consider that a piece of wood consists of what is called cellular structure; that is, a vast number of minute tubes or cells lying parallel with one another and running the length of the piece. These can be seen by taking a piece cut smoothly at right angles to the grain and examining it with a strong pocket magnifier, when the porous nature plainly appears, and one can readily understand that, when wood is wet, the cells are filled and cause the piece to swell, and when it is very dry these cells become contracted and the piece shrinks.

If a board or plank checks from not being properly seasoned, the fractures will be in radial lines from the pith to the bark of the log. The sap cells, of course, increase in numbers as they pass outward from the

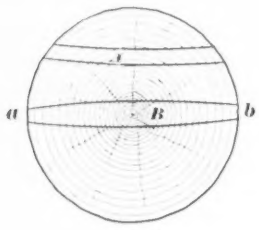


*Fig. 1*

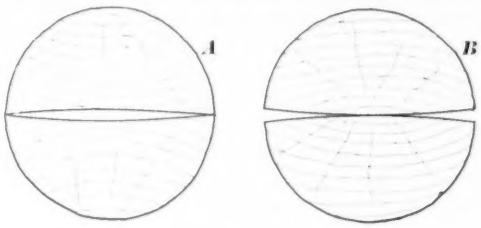


*Fig. 2*

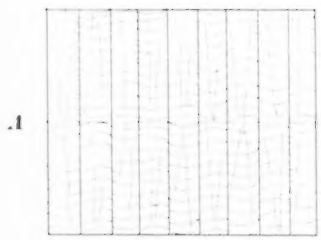


*Fig. 3*

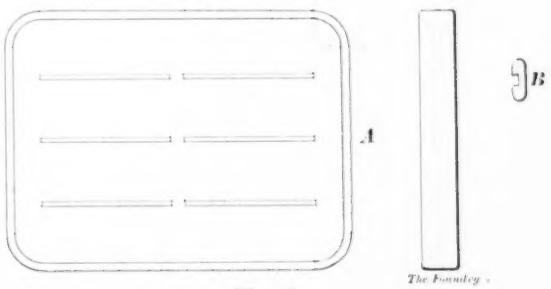


*Fig. 4*

center of the tree, and when they contract too much something has to give way, and a check is the result.

When a board warps, the cells are either contracted or swollen on one side more than on the other, and when one side is much the dryer, this will be the concave side; and on the other hand, if we wet either side, then this will be the convex side, as the cells are swollen and force the piece out of its natural shape, but when a board is cut from a log and has the same atmospheric conditions on each side, it will warp as shown in an exaggerated manner at Fig. 1, the concave side always being towards the bark of the tree. If cut directly through the heart, this tendency to shrink to one side is neutralized, but as we pass outward the boards will warp as indicated. In explanation we will consider that the wood cells are everywhere between the annual rings of growth, and as they contract it tends to straighten the rings, and the board then bends toward the outside of the tree.

If a plank of any considerable thickness be cut through the center of a log, while not having any natural tendency to warp one way more than another, still there will be a slightly greater shrinkage at a b than in the middle, and the board or plank when dry will consequently be slightly convex on both surfaces as shown at B, much exaggerated. In pattern lumber we seldom find a plank very close to the heart of the tree, however. Wood will not shrink any lengthwise of the grain that we can notice, so we can remember that as a fact at the outset, the same as we do about vertical lines not converging, in perspective drawing. But across the grain the shrinkage is so great that no pattern can be made until the wood is perfectly dry.

Perhaps by this time the molder who has followed these remarks will realize that the patternmakers' material is not of such an unyielding nature as he previously supposed, and will be rather more lenient when he gets hold of a pattern that has sprung out of shape, remembering that in addition to warping and shrinkage which the patternmaker tries to prevent, he (the latter) can do nothing to guard against the moisture the pattern may come in contact with in the foundry, with its resultant swelling, except to have it thoroughly shellaced, and keeping it so, this varnish being impervious to moisture.

If a molder sees that a pattern has gone out of its original shape, and is in doubt whether it has shrunk or swollen, let him examine it carefully where end and cross-grain come flush with each other, and when the cross-grain falls behind the end-grain, the pattern has shrunk, while, if it protrudes by, then the pattern has swollen.

As we have been examining some of the characteristics of wood, we can now see how the patternmaker can take advantage of them in the construction of his work, and make it hold its shape better. Even in the cheapest kind of work a pattern when turned in halves can be so arranged that the tendency is to have the edges keep together as at A, Fig. 2, and not rocking-chair fashion as at B in the same figure. It takes no longer to do one way than the other, and only a little forethought is required.

The ideal way to place the stock in almost any pattern when in halves, to best prevent warping, is as shown at Fig. 3, when it is glued together in narrow pieces above and below the line A B, having the pieces selected so that the rings of growth are at right angles to the edges of the strips. But this is not usually practicable, and we have to glue up the strips just as they come, without much reference to the way the rings of growth occur in the pieces.

Unless great pressure can be brought to bear on glued joints with clamps, it is well to avoid them as much as possible on the sides of patterns where they drag against the mold when being withdrawn. For example, let us take Fig. 4, which represents an ordinary plain ribbed table to stand on legs for holding any small machine. The flat part, or web, should be made of several narrow strips placed from one-sixteenth to one-eighth inch apart, separated by thin pieces the width of the opening, to counteract as much as possible the tendency to shrink, for if the parts were glued close together, edge to edge, they are in effect one wide board, but when separated, the air has a chance to get between them, and the liability of their changing is lessened.

If we glue the strips or beading directly to the web both above and below, it is evident that we have two continuous glue joints entirely around the edge of the pattern, parallel with each other, and with no chance to bring great pressure to bear on them, to force out any unnecessary glue.

The result is that after the pattern has been through the sand a few times we can

trace two parallel lines of sand adhering to it, for the dampness of the mold acts upon the glue and causes any excess which may have been left in the joint for lack of pressure, to exude, and the molding sand sticks to it every time, causing a burr, or ridge, which is no help to a molder in withdrawing a pattern.

In this particular case we can remedy this defect, and at the same time use but one-half the number of pieces, by getting out the beading in strips the whole width of the sides, rabbeting in a groove in the middle of each as shown at Fig. 4, B, to envelop the outer edge of the web. The curves can also be turned in one piece, and then be cut in quarters. By this form of construction we have saved eight separate pieces, besides two glue joints passing entirely around the edge of the pattern; the only joints now being left on the sides, being eight very short ones, perpendicular to the sides of the mold.

A pattern in the form of a ring will soon shrink one-sixteenth or an inch in diameter if turned up from a solid piece, so all patterns of this form have to be made in rows of segments, with three or more rows, for with two layers one will pull against the other, and the strongest will master, and pull the other with it. If three rows cannot be used, then use one row the full width required and tongue the joints with strips running at right angles to the places grooved out to receive them. This tonguing joints with one or more strips is almost always done in flat, circular webs, having either four or six sections placed together edge to edge like pieces of pie.

All these little things will help to make a pattern hold its shape and fulfil the requirements of a good pattern. The order to be observed is, first, good material; second, careful construction, and lastly, a proper finish. This last point reminds me of something that I once saw in the question and answer column of a well-known paper, and it will probably cause a molder to smile. Someone wrote, asking if a pattern could be got so slick and smooth that it would not leave the sand easily, as he had heard that it could. I fancy all molders would gladly take their chances on patterns of that description.

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I would not be without THE FOUNDRY.
J. C KNOEPPEL.

## Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Chicago, Wednesday, Dec. 21, at 7:30 p. m. The attendance was small, owing to the inclement weather and the proximity of the holidays.

The regular order for the evening was the reading of the following paper by Max H. Wickhorst, engineer of tests, C., B. & Q. R. R. Co., Aurora, Ill., on

### POROUS CASTINGS AND OCCLUDED GASES.

Porosity and blow holes in iron, steel, brass and bronze castings, are generally due to occluded gas. To start with, I will explain somewhat fully what occluded gas is. Various molten metals, such as copper, silver, iron, have the power of dissolving different gases, such as hydrogen, sulphur dioxide and carbonic monoxide. These gases dissolve in the molten metal just as air dissolves in water. If a glass of water is drawn and allowed to stand in a warm place the air bubbles will collect along the sides of the glass, and if water is frozen the ice formed will contain air bubbles, due to the dissolved or "occluded" air liberating itself at the time the water freezes, or sets, or passes from the liquid to the solid state. So, also, if molten metal contains occluded gas, the gas shows no tendency to escape while the metal is in the molten condition; but as soon as the metal starts to set, the gas starts to liberate itself and assumes the gaseous state, forming air bubbles or blow holes throughout the mass.

The gases which may be occluded, or dissolved in molten metals, are hydrogen, sulphur dioxide and carbon monoxide. The two other gases which are generally present when metals are melted, namely, carbon dioxide or carbonic acid gas, and water vapor, probably do not dissolve in molten metals.

### HYDROGEN INTRODUCED IN CASTING BRASS AND BRONZE.

Brass and bronze are most frequently rendered pourous by hydrogen; bronze containing little or no zinc being specially liable to be defective from this gas. Hydrogen is a very light, inflammable gas. It weighs only about one-fourteenth as much as an equal volume of air. It is very inflammable, and is an important constituent of the fuel gas known as "water gas." The product of its combustion in air is water. The

hydrogen gets into the metal by the decomposition of the water of the mold, when the metal is poured too hot. Water is a liquid formed by the chemical union of the two gases hydrogen and oxygen, in the proportion of two volumes of hydrogen to one of oxygen, its formula being H2 O. Water is liquid at ordinary temperatures, and becomes a vapor at 212 degrees F.

When bronze is poured into a green sand mold much above the proper temperature, the metal does not set right away, but remains liquid in the mold. It decomposes the water of the mold, separating the water into its constituent elements, oxygen and hydrogen. The metal combines with the oxygen, forming oxide. If zinc or aluminum are present, these combine with the oxygen, forming an oxide which comes to the top and separates from the metal. If no deoxidant such as zinc, aluminum or phosphorus is present, the oxygen combines with the copper, forming oxide of copper, which remains mixed with the rest of the metal, and in the fracture of such metal it forms red and green colored spots.

The hydrogen of the decomposed water, however, does not form any chemical combination with the metal. But the molten metal dissolves it very readily, the hydrogen being absorbed without having its chemical nature changed. While the metal is still molten the hydrogen remains quietly in the metal, but as soon as the metal begins to set, the hydrogen tries to liberate itself, going back into the gaseous state and forming bubbles throughout the mass, and causing a porous casting. Such porosity does not show itself on the surface of the casting, but can be seen only by machining off the skin, or chipping into it, thus getting into the body of the metal. This is as would be expected, since gas bubbles start to form only after the skin is set.

Brass and bronze containing fluxes such as zinc, aluminum, maganese or silicon are not apt to be porous from decomposition of the water of the mold, since the skin of oxide which these form as soon as air gets at the metal, forms a lining along the inside of the mold which prevents any communication between the molten metal and the moisture in the mold. Bronze which has been fluxed with phosphorus, that is phosphor-bronze, however, is very apt to be rendered porous due to hydrogen obtained by decomposition of the water of the mold. Phosphorus combines with air or oxygen, going off in the form of a white smoke, and leaves the surface of the metal perfectly clean. The molten metal and the moisture of the mold come in direct contact, with the result that the moisture is decomposed, the oxygen combining with some phosphorus going off as white smoke and the hydrogen becoming occluded and afterwards causing porosity. This is a result which is actually frequently the case where phosphor-bronze is poured at too high a heat. To corroborate the above explanation of the metal decomposing the water of the mold, and thus introducing hydrogen into the metal, I have made the following experiment: Melt about 50 lbs. of phosphor-bronze, composed of about 10 per cent tin, one-half per cent phosphorus and the rest copper, and get it very hot. Pour a small casting with this, say a two-inch round rod, six inches long, in a green sand mold. The metal will remain quietly in the mold a short time, but after one or two minutes it will start to rise back through the gate, due to the hydrogen which had been absorbed liberating itself, assuming the form of bubbles and thus taking up more room. And the metal is then of necessity forced back through the gate. If this casting be broken when cool, it will be found to be porous, and the gate, especially, will be honeycombed.

After pouring the first casting, pour a little of the metal into an iron ingot mold and when this has cooled sufficiently, cool off the metal in the crucible by stirring the cooled ingot into it till it has been cooled down to a proper pouring temperature. Then pour another casting similar to the first in every respect, and it will be found that the metal runs into the mold quietly and remains there. When this casting is broken it will be sound. This experiment proves that merely getting the metal very hot does not spoil it for making good castings, but that when poured at this high temperature, a reaction goes on with the materials of the mold which produces the bad result, as regards porosity.

### HYDROGEN PRESENT IN THE INGOTS.

The foregoing deals with the presence of hydrogen due to faulty handling of the metal by the molder. Most of the phosphor-bronze used is bought in ingot form, and a great deal of the material on the market is already defective from the presence of occluded hydrogen, and will give porous castings when used, and the explanation of the presence of the hydrogen is as follows: Phos-

phor-bronze is usually made by melting the copper, tin and lead and then introducing the phosphorus by means of a cup-shaped instrument called a retort or phosphorizer. Phosphorus is a wax-like substance and comes in about the shape and size of a candle. It melts at about 110 degrees F., and catches fire with the utmost readiness, so that it has to be kept under water. The phosphorus is put into the retort, either moist or wrapped in moist paper, and the retort then plunged into the molten metal, mouth downward. The phosphorus melts and combines energetically with the metal. The moisture which is present is also decomposed in the presence of the molten metal and the high heat. The oxygen combines with the phosphorus going off as oxide of phosphorus in the form of a white smoke. The hydrogen dissolves in the molten metal and when the metal is poured into ingots it cools so rapidly that the gas has no chance to escape, but remains fairly evenly diffused throughout the ingot. Whether an ingot is defective from the presence of occluded gas, can be told by the appearance of its upper or open surface. An ingot free from occluded gas will have its upper surface concave and shrunken in, and may even be somewhat cracked due to shrinkage. Another ingot, however, containing occluded gas will have a convex surface and be bulged out. This is because the gas, while the ingot is cooling, makes an attempt to get away, and in doing so bulges out the ingot.

The introduction of gas into phosphor-bronze in the manufacture may be avoided by having the phosphorus perfectly dry. As ordinary phosphorus cannot be dried without danger of igniting, the phosphorus is first put into a dilute solution of sulphate of copper or blue vitrol for half an hour or longer. This deposits a coating of copper on the phosphorus, which allows it to be dried without danger of igniting, so long as the copper coating remains intact.

I read a paper before the Western Foundrymen's Association in March, 1897, which explains in detail the manufacture of phosphor-bronze. Phosphor-bronze made with dried phosphorus will not contain any occluded gas.

### ACTION OF OCCLUDED GAS IN PHOSPHOR-BRONZE BEARING METAL.

In phosphor-bronze metal the effect of occluded gas is detrimental and serious in that it causes hard spots in places in the metal. This metal has usually the following composition: Copper, 79.3 per cent; tin, 10.0 per cent; lead, 10.0 per cent; phosphorus, .7 per cent.

In this mixture, the tin combines chemically with some of the copper, forming a copper-tin compound, which is gray in color, very hard and has a low melting point. The bronze therefore contains no free uncombined tin. The lead forms no chemical combination but remains simply mixed with the rest of the ingredients. The phosphorus probably combines with the lead to make phosphide of lead. The excess of copper not necessary to combine with the tin remains as free uncombined copper.

So that in the crucible, the molten metal consists of free uncombined copper, copper-tin compound, lead and phosphide of lead. When bearing phosphor-bronze which contains considerable occluded hydrogen gas is cast, it flows into the mold quietly and remains quiet for about one or two minutes. If the gate of the casting be watched it will be noticed that after about two minutes, little beads of metal, with the appearance of melted lead, come oozing through the top crust of the gate and stand there like drops of sweat. These beads are very hard and cannot be filed, and are gray in color. If the casting be now cleaned, nothing peculiar can be seen on its surface, but if the top of the casting be chipped into, or the skin machined off, or the casting broken in two, it will be noticed that the casting is porous and full of blow-holes. If the gate be broken in two this will be specially honeycombed. If the fracture be examined it will be noticed that the gas cavities are all bright yellow, and that the gray portions of the copper-tin compound and the lead are perfectly sound and solid. This shows that it is the free copper in the bronze which dissolves or occludes the gas. After the metal had been poured, the constituent copper started to set first, it having the highest melting point, leaving the copper-tin compound and the lead still liquid.

While the uncombined copper is setting, it liberates the occluded gas, and this in trying to get away, forces the still liquid copper-tin compound and the lead ahead of it, and causing the beads to come out through the gate. I have analyzed some beads obtained as above described from a bearing metal phosphor-bronze of the above composition, with the following results:

| | Bead. | Body of Bronze about |
|---|---|---|
| Copper ..... | 74.66 per cent | 79.5 per cent |
| Tin ..... | 22.15 per cent | 10.0 per cent |
| Lead ..... | 3.06 per cent | 10.0 per cent |
| Phosphorus ..... | .37 per cent | .5 per cent |

It will be noticed that these beads consist practically of a copper-tin compound, this having taken along with it some lead and some phosphide of lead. There is not much lead present, probably because as lead mixes only to a small extent with the other materials and is much heavier it settles away and remains behind. If an engine driving brass be broken it will be noticed that although most of the bubbles collect near the top of the casting, some collect near the surface, even at the bottom, which is usually the bearing face. As the gas in collecting into bubbles pushes the hard copper-tin compound ahead of it, as we have seen above, hard spots form in the brass. As the hard spot takes all the weight of the bearing, excessive friction is created and a hot brass ensues.

### METHOD OF GETTING RID OF OCCLUDED GAS IN INGOTS.

Occluded hydrogen in ingot metal can be expelled by introducing oxygen or air into the molten metal, thus oxidizing out the hydrogen.

This can be done only by first oxidizing out all the phosphorus, as this takes the oxygen first. This experiment may be made to demonstrate the principle involved. Melt about 70 lbs. of phosphor-bronze, which has given trouble from occluded gas, and pour a casting from it. This will show that this particular heat is so defective. Then place back in the fire and when melted add sufficient ozide of copper to oxidize all the phosphorus and still have a slight excess left. Then re-phosphorize the metal and add enough lead and tin for the copper introduced and pour another casting. This will be found to be sound and free from porosity. I have made an experiment similar to the above, and while the original metal gave a very porous casting, the metal after treatment gave a perfectly sound casting. Commercially, this method, or any method involving the same principle, would not be practicable on account of the expense, and probably the best way to dispose of such metal, if one has such metal on hand, would be to mix it with enough good metal and use it where a slight porosity will do no harm.

### SULPHUR DIOXIDE GAS.

So far I have been dealing with hydrogen gas. Another gas which frequently causes porosity in brass castings is sulphur dioxide gas, chemical formula of which is $SO_2$. It is a gas of pungent odor, being the same gas which is formed when sulphur burns, and is used for fumigating purposes. It is also sometimes used in refrigerating machines. The different metals which go to make up brass may all contain sulphur. When brass is made of some metal containing sulphur, as soon as the metal comes in contact with air the sulphur combines with oxygen of the air, forming sulphur dioxide gas, which then acts in all respects similar to hydrogen. As I have already expanded somewhat fully on how hydrogen acts, it will not be necessary to explain further about the action of sulphur dioxide gas. I was foreman of the brass foundry of the C., B. & Q. R. R. for a while, and not long after taking charge of the foundry we had one or two heats of small miscellaneous brass castings show porosity when the casting was broken.

The brass consisted of copper, zinc, lead and tin. On looking over the list of materials used, it seemed probable that the trouble lay in the zinc containing sulphur. The zinc used consisted of old worn out battery zincs which had been melted up under charcoal and cast into small ingots. Now old zincs have considerable sulphate of zinc adhering to them, and when this is heated under charcoal, some of it is reduced to sulphide of zinc, which remains in the metal. When the metal is melted and poured containing such zinc, the air acting upon it, the sulphur has a chance to combine with some oxygen, forming sulphur dioxide and acting as before explained. The zinc was then separately melted without any covering of charcoal, exposing it freely to the air, and then recast into ingots. When only a limited amount of air combines with the sulphur, sulphur dioxide is formed, going off as gas, as probably zinc does not occlude this gas. When this retreated zinc was used, the castings were perfectly sound without any porosity.

### CARBONIC OXIDE OR COAL GAS IN STEEL.

Carbonic oxide or coal gas has a chemical formula CO. This gas is also a constituent of "water gas." It is an inflammable gas, burning with a hot light blue flame. It is odorless but very poisonous. It is the poi-

sonous gas given out by hard coal stoves, known as coal gas.

As far as my observation goes, brass and bronze are not liable to be defective because of this gas, as I have not seen a case where porosity could be positively attributed to it. The porosity of steel castings, however, seems to be frequently due to carbonic monoxide gas. When a heat of steel has been heated till the carbon is low and the silicon reduced below a certain point, the castings made from such a heat are apt to be filled with holes. The explanation for this seems to be that as long as silicon and manganese are present these combine with oxygen and remove it entirely from the metal. As soon as these are reduced very low, some of the oxygen combines with the carbon forming carbon monoxide gas, which then renders the metal "lively." If now a little aluminum is added this takes the oxygen and the metal is again made "dead." I am not a steel man and would hardly be bold enough to offer any theory concerning steel, if it were not for the fact that there is practically no literature on this occluded gas question, and also that what stray statements one may run across on this subject, show that the author generally has a wrong idea of the nature of the action of occluded gases. For instance: Campbell in his book on Structural Steel, in the chapter on steel castings, page 373, in speaking of aluminum and silicon versus manganese, says: "Another function which may play a part in the operation is the increase in capacity to dissolve or occlude gasses, and as far as the value of the casting is concerned, this will be equivalent to destroying them." The idea evidently being that the aluminum or silicon has such an effect on the gas, that when the metal passes from the liquid to the solid state, the gas likewise goes from the liquid to the solid state. We have seen, however, that when metal contains dissolved gas, the gas goes from the liquid to the gaseous state as the metal solidifies.

## DISCUSSION.

L. L. Smith, foreman C., B. & Q. R. R. brass foundry (Contributed): The paper of Mr. Wickhorst treats of a subject which so far as I have been able to discover, is practically untouched in metallurgical literature. Considering the importance of the phenomenon of occluded gases and the opportunities of gases for giving trouble, especially in alloys of copper, the fact that the subject has received so little attention from metallurgical writers is somewhat surprising. In the refining of copper, the operation of poling makes very manifest the possibility of gas being occluded. When the copper has reached the stage when it is to be purified by poling, the metal is practically free from metallic impurities, but it contains oxygen in the form of cuprous oxide which is held in solution in the metal. To reduce this cuprous oxide to metallic copper, the surface of the molten mass is covered with a layer of charcoal, and a green sapling or pole is plunged into the metal. The gases given off by the burning pole causes the copper to bubble and sputter violently. The gases, in permeating the metallic mass, come in contact with all parts of the copper and assist in reducing the cuprous oxide. If the poling has not continued long enough, a portion of the oxide remains unreduced, the copper is said to be "underpoled," and a test ingot dipped out will show upon cooling, a concave upper surface. If, however, the poling has been carried on beyond a point where the oxides have all been reduced, the gases having no oxygen to combine with will be occluded by the copper. The metal in this condition is said to have been "overpoled." A test ingot upon cooling will show a convex upper surface due to that peculiarity of copper which in the molten state has occluded gas and upon cooling has released it in bubbles which cause the ingot to swell.

I recently had occasion to melt some copper which had occluded sulphur dioxide, and upon being poured out into an ingot mold, the upper surface of the ingot swelled up like the top of a loaf of bread.

In copper refining, the cure for overpoling is quite simple, the copper being allowed to reoxidize, after which it is repoled up to the proper point. After copper has entered an alloy such as phosphor-bronze, if the bronze having been deoxidized by phosphorus occludes gas, the gas cannot be so simply eradicated as with copper in the refining furnace. As indicated in Mr. Wickhorst's paper, the alloy can be re-oxidized by adding cuprous oxide, and again de-oxidized by phosphorus, but this, as he points out, is a somewhat expensive process. A description of some inexpensive commercially practical method of getting rid of occluded gases will certainly form a welcome addition to metallurgical literature. It is best, however, to seek means of preventing the occlusion of

gas, for in this case, as in many others, "an ounce of prevention is worth a pound of cure."

An informal discussion of the paper was had, and Mr. Wickhorst gave a very interesting general talk on the manufacture of brass and bronze castings. It was decided to have the paper presented before the January meeting of the association, to give absent members a chance to hear and discuss it. The meeting then adjourned.

## Flask Pins.

By OSCAR OLDMAN.

Before you make that new set of iron flasks, let's discuss the question of flask pins. Why not have the best while you are about it? The best will not cost any more, to speak of, than the poorest.

The writer has used a great many kinds of iron flasks, and the pin illustrated in figs. 1 and 2 is, in every respect, the best he ever saw.

This pin has some advantages that may not appear at first sight. In the first place, it answers the same purpose that any other one does. Then, you should see, the dowel

FIG. 1.

plate and the pin-base-plate answer perfectly the purpose of handles, in the case of light flasks. The pin should be about ⅞-inch diameter, with but a trifle of taper till near the point. When one of these pins gets broken off, just drill a hole through the plate and thrust through another pin, having a base-plate, as indicated by dotted lines in the sectional view, fig. 1, and put a ¼-inch rivet through both base-plates and the job is done. Keep a stock of extra pins on hand, and whenever one breaks, shove in another and fasten with a single rivet and your flask will be as good as ever.

The hole in the dowel plate at one end of the flask must be round, and must fit the pin, practically; at the opposite end of flask, the hole should be of the slotted variety. This will permit of any possible variation in contraction of the flask pieces, and will entirely obviate the necessity of chipping or filing in order to a fit. You see, the round hole at one end will prevent shifting endwise, and the slotted hole at the opposite end will prevent sidewise shifting.

It will be seen that with the pin-base-plate and the dowel-plate so far apart there will be no chance for difficulty from obstruction getting between; nothing less than a chunk of pig iron would be in the way!

But, somebody says, "that's a difficult

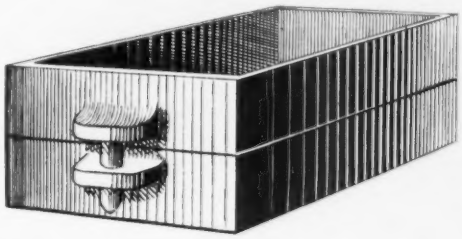


FIG. 2.

flask to make—in just that way—and casting the pins and plates in one piece with the flask." Not at all, my friend; just make core prints as indicated by dotted lines, and cores to fit, and when you get your flasks all made you will find that they cost you less than you could have possibly made them for in any other way, and you will have the best set of iron flasks that you ever used.

## How a Foundry Was Opened in Mexico.

A correspondent of the Mexican Herald at Tulancingo, Mexico, reports the opening of a new iron foundry at Palo Gacho, on January 3, amid the flourish of trumpets, champagne and speeches by high state officials: "Yesterday was inaugurated the new iron works, the property of Captain Frank Rule and Mr. Thomas Ivy, at Palo Gacho, near Metepec, in the District of Tulancingo, State of Hidalgo, in a most regal style. A special train left Pachuca shortly after eight o'clock with the governor of Hidalgo, Don Pedro L. Rodriguez, Captain Frank Rule, his three amiable sons and about twenty other well known and distinguished Pachucaians, both Mexican and English. They were met at Tepa by another special, bringing Lic. Don Justino Fernandez, the Messrs. Gabriel and Thomas Mancera and various other notable guests of Captain Frank (as he is familiarly called) and Mr. Ivy. At Tulancingo they were joined by the Jefe Politico of the district and various friends of the proprietors of the new enter-

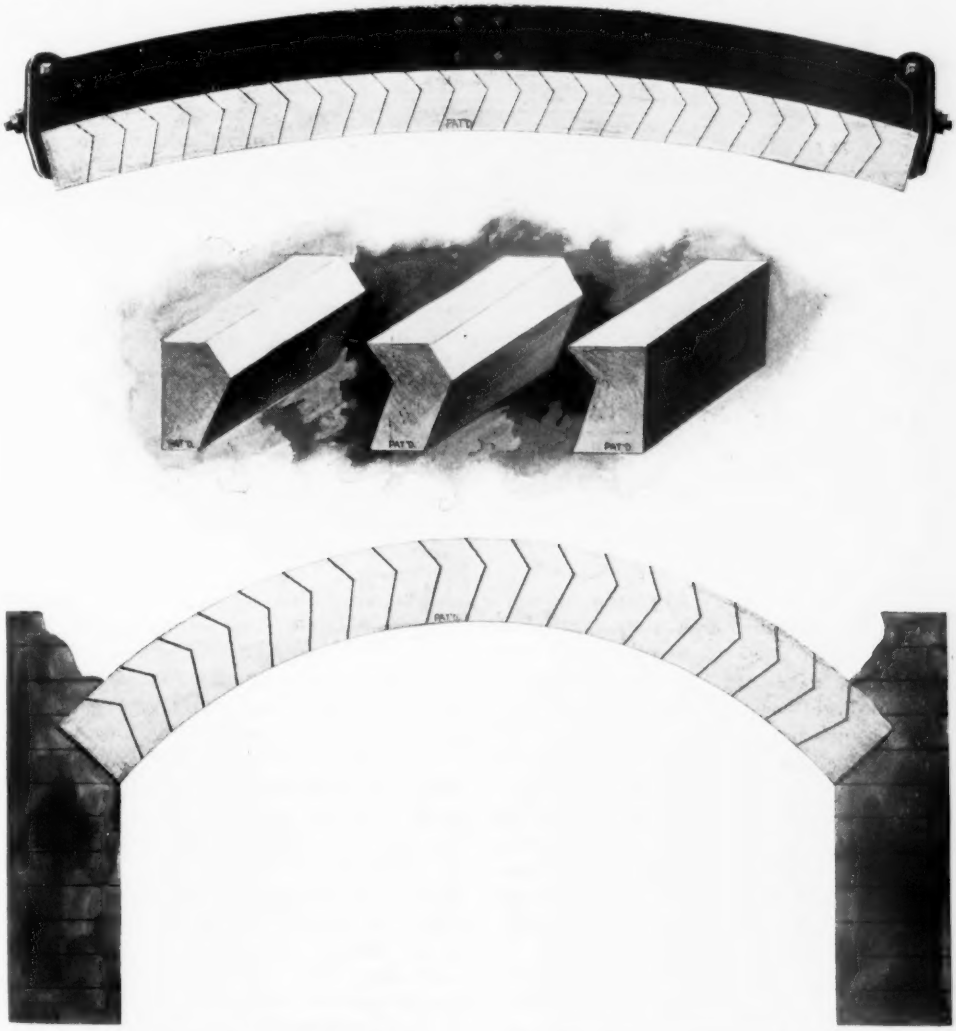
prise, and then proceeded to the station of Tortugas with the very good band of music of Tulancingo. An ample lunch was provided on board the train in a special car for all visitors. Upon arrival at Tortugas most ample accommodation was provided in the way of coaches and carriages for the conveyance of the invited guests to the then unnamed works, which are about two leagues distant. On the way the prosession of carriages passed through the small yet important village of Metepec, where the governor was greeted with triumphal arches, rockets, etc., then off to the works at Palo Gacho. Everything was found in perfect order, the engine going as smoothly as possible to imagine, the furnace charged and lighted ready for the inauguration. After a look around at the various parts of these most commodious, ample and modern works the dinner was announced, which your correspondent assures was a regal affair. Nearly a hundred sat down to enjoy the feast. The tables were well provided with glass, napkins and everything that makes one comfortable and at home. As to the menu, it was so excellent I will not attempt to describe it and, too, so abundant that there was enough left of the good things to serve over again for as many more. As to wines and beer, they seemed to flow from a fountain. Champagne, etc., was ad libitum. The table was served by mozos from Mexico who knew their business, and the bands from Tulancingo and Metepec discoursed delightful music during the banquet. Truly Captain Rule and Mr. Thomas Ivy are fine hosts. After this sumptuous spread came the event of the day. The christening of the works by the governor, who dashed a bottle of champagne at the mouth of the furnace, giving the name 'Victoria,' in honor of the queen, of whom Captain Frank Rule and Mr. Thomas Ivy are loyal subjects. The furnace was then opened and from it flowed a stream of the liquid iron, amid vivas and hearty good wishes for the success of the new enterprise."—Iron and Steel.

## The Life of Ingot Molds.

By R. G. G. MOLDENKE.

The life of ingot molds as made in Germany is discussed by Mr. Simmersbach in an article in "Stahl und Eisen," the highest authority in the iron industry of Continental Europe. Those of us who know how difficult it is to make acceptable ingot molds will be surprised to see how high the injurious elements are allowed to run in the pig irons used for this purpose on the other side of the water. The silicon is specified at 1.50-3.50 per cent, manganese 0.60 to 1.20 per cent, total carbon 3.50 to 4.40 per cent, sulphur not over 0.075, phosphorus not over 0.120, and copper not over 0.125. Any arsenic present is classed with the sulphur, as its effect is practically the same. Copper does not bother us specially in this country, but in Europe it is quite common, even silver occasionally entering into the composition of pig iron. High manganese is claimed to be an advantage, as it helps to eliminate sulphur, which, if anything, would be increased in the remelting by contact with the coke. The above analyses are for the pig iron allowable in making ingot molds. Here is the normal composition of a good European casting of this class: Silicon, 1.6 to 3.0 per cent; total carbon, 3.3 to 4.4 per cent; manganese, 0.5 to 1.1 per cent; sulphur, not over 0.075 per cent; phosphorus, not over 0.125 per cent, and copper, not over 0.125 per cent. A rather curious claim is made by Mr. Simmersbach when he states that silicon which has been reduced from the lining of the cupola causes trouble in the ingot mold. He attributes this reduction to the effect of overheating, for he finds that sometimes there is more silicon in the casting than was in the charge. The trouble thus caused is found in the separation of too much graphite and its irregular distribution. The probable cause is not the added silicon, which, by the way, blast furnace men would say came from the ash of the coke and not the lining, but the overheating of the iron. The effect of high sulphur in the coke is quite marked, as it not only gives high sulphur castings, but lowers the total carbon, a case in point being a pig iron with .05 per cent sulphur and 4. per cent total carbon, which came out 0.27 per cent in sulphur and only 2.8 per cent total carbon. Another interesting point is the absorption of phosphorus from the coke under favorable circumstances. As to manganese, Mr. Simmersbach states that a 1 per cent manganese ingot mold lasts longer than one with 0.5, everything else being equal. Great care must be taken in drying the mold, casting at the proper time and in the proper manner. It takes more skill to cast ingot molds, which have so much to endure in the steel

casting house, than ordinary jobbing work. The thickness of the walls of an ingot mold are usually specified by the purchaser. In Germany the practice runs about as follows: A half ton mold is 2½ inches thick, tapering to 2 inches; one ton, 2¾ inches to 2⅜ inches; two tons, 3½ inches to 3⅛ inches; three tons, 4¼ inches to 3⅞ inches; six tons, 4¾ inches to 4⅜ inches; ten tons, 5½ inches to 5⅛ inches; fourteen tons, 7⅛ inches to 6¾ inches.



**Something New in Fire Brick.**

From the cuts it will be seen that the brick are made with a shoulder, which gives independent support to each brick and relieves the outward pressure on the side walls and prevents them from spreading and the arch from coming down. As they contain all the points of the old-style arch brick, being tapered to form the circle, they have the advantage of this shoulder, also two special shape end pieces, with shoulders for the body of the arch to rest on. The expansion or contraction caused by sudden changes of temperature cannot be great enough to cause these brick to drop out of the arch, as they have, by their peculiar construction, five to ten times the binding force of the old-style arch brick.

In furnace construction they will fill a long-felt want, for with them it is possible to get a flatter roof (a thing much sought); also to build a furnace of greater dimensions. In fact, the possibilities of furnace building are unlimited when these brick are used.

They are recommended for use in malleable plants, as they will stand longer in a bung than any other brick, and will not drop out when the bung is lifted off.

It is claimed that they are made from the most highly refractory clays, specially mixed for furnace roof construction. Second, that they will not fall out of the roof or bung of the furnace. Third, from their peculiar construction, they have five to ten times the binding force of the old-style arch brick. Fourth, they are made true to size and lay a more perfect arch than any other brick. Fifth, that they are made larger and will take less to build an arch than the old-style brick. Sixth, they do not cause the side walls to spread.

In ordering these brick it is necessary to state size of furnace and radius of arch in order that the proper size brick may be sent. This brick is called H. S. Vrooman's patent arch brick; in addition, however, a full line of regular fire brick is carried in stock, and any of these may be had of H. S. Vrooman, 220 West Twentieth street, Chicago, Ill.

# CAST IRON NOTES.

**Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.**

### COLD SHUTS IN CASTINGS.

What is the cause of cold shuts?

Answer: As melted iron flows through a mold, a skin of oxide forms on the surface. If a similar stream of iron comes from an opposite direction, entering from another gate, its forward surface will be covered with a similar coating of oxide. When the surfaces meet, if the metal is hot enough, the surfaces will unite and the oxide will float to the top of the mold and a perfect union will take place; but if the iron is run very near solidification, the surfaces will press against each other, but no union will take place. Sometimes the metal will unite at some points and not at others. If the casting is thin, the cold shut may show on both sides. If thick, it may extend only a very short distance beneath the surface, there being a perfect union at the center and upper part of the casting. Such a cold shut weakens a casting just as the cut of a fine saw to the same depth would do, and, worse than that, we never know how deep it reaches.

The prevention lies in the use of hotter iron or placing other gates so as to cause the iron to flow a less distance. A curious result of this skin of oxide occasionally occurs in castings of about 1-12th of an inch in thickness in cold weather. After traveling a considerable distance, the iron being just fluid enough to fill the mold. Once in a while, on the bright under surface of such a casting, which brightness is due to the iron being too cold to melt the sand, a multitude of grains project from this under surface and are crowded into the mold's surface. The general surface of the casting will be soft, but these small projections, which are about the circumference of grains of wheat, are so hard that they cannot be cut with a file. Slightly increasing the thickness of the pattern will cause the casting to be smooth.

### WHAT CAUSES DULL IRON?

During a heat in which the iron is very hot, why does the iron occasionally become dull and in a few moments become hot again?

Answer: I think remarks on the causes of dull iron, if given by the readers of THE FOUNDRY, would be of great value. There should be no mystery about iron melting. A mistake in making up a charge of coke or the uneven distribution of a charge of iron might cause too much iron on one side of the cupola, but there are cases where the weights of both coke and iron are exactly right and where the greatest care is exercised in charging, and yet the iron is dull for a few moments and then revives and is as hot as ever. I am speaking of cupolas where the iron is drawn off as fast as melted. I am inclined to think that such change is caused by a part of a pig of iron falling through into the hearth before it is melted. It would be melted by the fluid iron around it and might reduce the temperature of the iron in the hearth so much as to make the difference apparent in the stream at the taphole. A case of dull iron, a short time ago, suggested this cause, and it was found that the molds for the pig bed back of the cupola made the pigs nearly twice the thickness of an ordinary pig of iron, and they were about 18 inches long and covered about half an inch thick with sand when charged in the cupola. On the day when the dull iron occurred several of these pigs were put in one charge. The cupola melted so fast that it was difficult to keep the iron

even with the door. If the large pieces were not all melted when the coke had burned out, so as to take them below the melting point, they must be held up from the hearth by the coke in the bed, or if they descended far enough, they would be melted by the fluid iron in the hearth. A new pattern was made for the pig bed, a little smaller than an ordinary pig, and no further trouble was experienced.

### THE CENTER BLAST AGAIN.

I received the following letter a short time ago:

"I am at work on a new style of center blast tuyer, which can be attached to any cupola without a great deal of extra expense, and I would like very much to hear from you or those that have used center blast why they are not in more general use, as they should, if properly constructed, be very economical and efficient. My center blast is always ready for use, and will not melt off. Please address 204 English street, New Haven, Conn.

P. S.—Being a practical foundryman, I think my idea of the center blast tuyer is ahead of anything I have yet seen.

Answer: I give the address that any one who is familiar with the subject may be able to communicate with the writer. Back numbers of THE FOUNDRY contain a great deal of literature on the subject, but late developments do not seem to have been recorded.

### SHORT POSTAGE ON AN ENGLISH LETTER.

Some time ago I received a request from a firm in Wales to obtain information for them regarding a process used by an American firm of malleable iron founders. I wrote the American firm, inclosing return postage, and I inclosed their very full and courteous reply to the firm in Wales, not noticing that the letter was overweight, but my address on the envelope would indicate that my letter contained the reply to their inquiry, yet they stamped it "Refused on account of short postage." I do not often complain when the inclosed stamp is forgotten, but I am inclined, in this case, to wait and see if the reply is worth the accumulated postage.

## An Explanation.

In THE FOUNDRY for January last we published the paper on "Cast Iron," by Dr. R. G. G. Moldenke, and by an oversight omitted to state that the paper was read before the Engineers' Society of Western Pennsylvania. We regret the occurrence, and take this opportunity of making amends.

## The Way Out; or The Wise Foreman.

By C. RITIC.

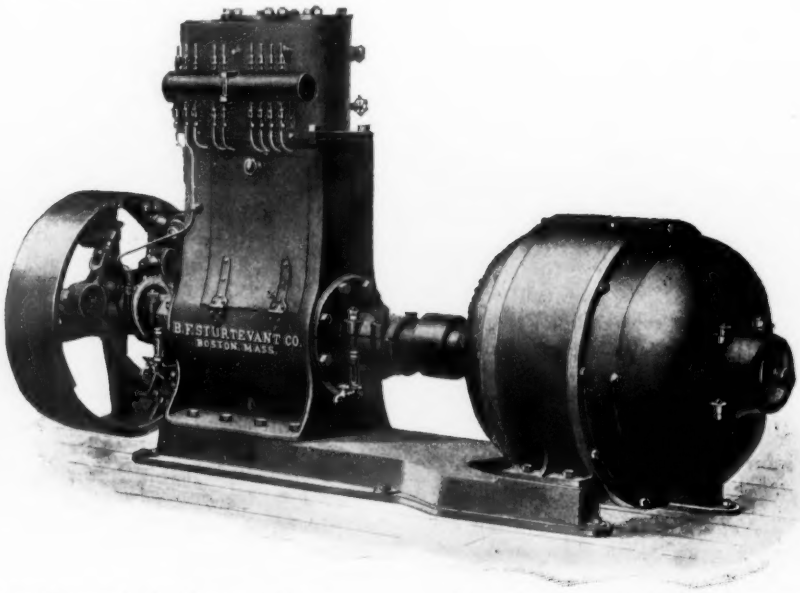
A few days ago the foreman handed me a pinion pattern 18 inches in diameter and 12 inches face, saying that the patternmaker would fetch the shrouds for top and bottom later on, when he should find them. It was late in the day to start such a job, so I hastily procured three drags six inches deep and twenty-four inches square, had the carpenter nail them together three deep by use of cleats on the outside; then we nailed strips of three-cornered material all round at the point that was intended for the bottom edge of cheek, the object of which will be explained later on. After a hasty application of clay wash the pattern was laid on a board, teeth tucked up and cheek placed in position. After ramming up as high as top of teeth, a small hand-rammer was used to ram up to the three-cornered strips on the inside; then an inclined parting was made from strips down to within three-quarters of an inch of the teeth, and on a level with them. About that time the pattern carrier handed me one of the shrouds, which was put in its place, and after carefully tucking facing all around it, the molding of this part was finished and the whole rolled over. As the order called for it to be drawn two inches, I had previously placed blocks of that thickness under the pattern. I now staked the flask with spikes driven into the bottom board, and after drawing the pattern a little above the level of the joint, fastened it there, lifted the cheek off, set the two-inch blocks on the bottom shroud and returned the cheek, tapped the pattern lightly until it rested snugly on the blocks, and made the parting on top.

Just then the pattern carrier came in and informed me that the other shroud could not be found. The foreman now appeared upon the scene, scratching his wise head, and started off to consult the patternmaker about getting up a new one. While he was gone an idea struck me. I lifted the cheek off, removed the two blocks, drew the bottom shroud out, pulled the core-print off, replaced the two-inch blocks, and finding the thickness of the shroud, laid other blocks of

like thickness instead, and, returning the cheek, placed the bottom shroud on top and finished the mold in the usual way. But just before closing the cheek on with blocks in the foreman came strolling along, sized things up for a minute and said: "I was just going to tell you to do that. The patternmaker has gone to the races!"

### A Dust Proof Generating Set.

In the illustration which accompanies this description, is shown a generating set which is, above all, remarkable for the novelty of its appearance. The engine, which has two cylinders, and is operated by a single piston valve, has its moving parts entirely enclosed within a substantial case, access to which




can be had through the door as shown.

The oil tank is supported outside of the cylinders, and provided with individual sight feed oilers and tubes, serving to supply oil continuously to all bearings, and rendering it unnecessary to open the engine door under ordinary conditions of operation.

The cranks, which are two in number, are set at an angle of 180 deg. so that the reciprocating motion is balanced, and high speed is made possible.

Regulation is secured by means of a governor of special construction.

Directly connected to the end of the engine shaft by means of a flexible coupler is the armature shaft, which is supported in two bearings provided with ring oilers, one in either end of the nearly spherical case which forms a part of and otherwise contains the generator.

The central portion of this casing is formed by the cast steel field ring, to the sides of which the hemispherical ends are bolted. These ends are provided with doors which render the interior perfectly accessible. The machine is of the four pole type, with independent windings for series and shunt.

The armature is of the barrel wound type, and designed for minimum losses and consequent low temperature.

The reaction type of brush-holder is employed, so that nothing but primary adjustment is required and sparklessness is attained.

The generator is designed so as to keep within proper limits the temperature rise under continuous operation.

It is evident from the preceding description that this type must be of great utility wherever the atmosphere is laden with dust which would be detrimental to the operation of the machine.

It is likewise useful in an atmosphere in which moisture is present in excess.

This set is one of a series designed and built by the B. F. Sturtevant Co., of Boston, Mass. The smallest size set of this series has an engine with two 3½ by 2½ cylinders. The output is 3,750 watts, and the weight of the entire set is 1,550 lbs. The largest size at present manufactured is equipped with

a 5 by 4 engine, the output being 11,000 watts and the weight 3,800 lbs.

## A Useful Alloy.

Experiments in the Sibley laboratory at Cornell University have shown that an alloy of two-thirds aluminum and one-third zinc possesses some remarkable qualities. It is white, and takes a fine finish, and is equal in strength to good cast iron, but superior to it in elasticity. On the other hand, it melts at 800° or 900° Fahrenheit, and can be liquefied in a ladle over an open fire. In the liquid form it fills a mold, running into all the small parts, much better than brass, but is more brittle than brass. With it small castings can be made without the use of a foundry furnace.

## Personal.

Mr. Will Powderly has taken the position of foreman of the Weir-Craig Foundry, Chicago.

James Bowron, of the Tennessee Coal, Iron & Railroad Co., is soon to sail for a trip to the West Indies.

A. A. Converse has accepted the position of foreman of foundry at the Slater Engine Works, Warren, Mass.

Wm. Ward has recovered from a protracted illness and has resumed the construction of his new foundry at Milford, Me.

Fred T. Warfield, whose foundry at West Gardner, Mass., was destroyed by fire some time ago, has gone to work in a foundry at Fitchburg.

L. D. Warner has resigned the presidency of the Naugatuck Malleable Iron Company, and Mr. Harris Whittimore was chosen as his successor.

James B. Goyle has sued the Missouri Car and Foundry Company for $20,000 damages, alleging that he was permanently injured by being crushed by a heavy timber while in the employ of that company, on August 22, 1898.

Mr. Edward Welch has resigned his position as foreman of the Weir-Craig Foundry Company, Chicago, to accept a similar position with the Illinois Iron Works, Chicago, at a salary of $1,900 per annum, a considerable increase on his former salary.

Mr. Anthony Knapp, formerly of Buffalo, N. Y., is, since last September, foreman of foundry with Close & Caldwell, machinists and founders, Bradford, Pa., where, upon the attestation of the firm itself, he is giving good satisfaction. We congratulate friend Knapp.

## Among the Foundries.

W. T. Stackhouse, of Wilmington, Del., has purchased the Elkton Foundry, at Elkton, Md.

The Foxboro Foundry and Machine Company has made an assignment for the benefit of creditors to Fred H. Williams.

It is announced that the Geiser Manufacturing Company, of Waynesboro, Pa., will remove their works to Chicago Heights, Ill.

It is reported that the Nashua Iron and Brass Company will make a change in management soon, and will make many improvements.

Sales Bros., dealers in heavy hardware, Detroit, Mich., have bought out the iron and brass foundry business of James Flower, Bros. & Co.

John P. Staub has bought the Knoxville Foundry and Machine Works, of Knoxville, Tenn., and expects to do a large business throughout the south.

The property of Geo. A. Stephens, of Hartsville, Mass., has been attached for $34,600. Mr. Stephens has for many years carried on an iron foundry in that city.

Seventy-five core-makers went on strike at the National Malleable Castings Company's plant, Toledo, O., because the company refused to discharge an objectionable foreman.

Chile, desiring to exploit her large deposits of iron, has issued a decree, confirmed by her Congress, offering a bounty of $125,000 to any firm which will establish an iron foundry in the republic.

January 10th the Cohoes Iron Foundry and Machine Company held an election and chose the following officers: President, A. E. Johnston; vice-president, Sarah A. Shields; secretary and treasurer, D. S. Johnston; manager, Jerome Garland.

Mr. Edward W. Dowd, formerly superintendent of the Nashua Iron and Brass Works, has purchased the foundry plant of Bell & Casey, of Norwood, Mass., and will confine the work to snap flask orders.

On December 1 the Brainard Milling Machine Company bought out the Brainard Foundry, at Hyde Park, Mass. They will add 50 feet to the foundry and will triple the size of the machine shops. The foundry will be run under the old management.

The American Foundry and Machine Company, of Bowling Green, Ohio, has elected

J. R. Hankey president, J. G. Hickox secretary and A. E. Royce treasurer. The board of directors consists of, in addition to the above, J. H. Whitehead, J. O. Troup and J. C. Lincoln.

The Union Iron Works, of San Francisco, Cal., and the Milwaukee Steel Castings Company have purchased the right to work under the Tropenas steel process. The former company will erect two 2-ton converters, the latter one, with the intention of erecting another later on.

The P. P. Mast Company, of Springfield, O., January 1st elected the following officers for the ensuing year: President and treasurer, Chas. R. Crain; vice-president, C. C. Kirkpatrick; secretary, J. W. Spahr; directors, John Foos, C. C. Kirkpatrick, L. C. Evans, J. W. Spahr and C. R. Crain.

At the annual meeting of the Toledo Car Wheel and Foundry Company, at Toledo, Ohio, the following officers were elected: President, C. E. Milmine, New York; secretary and treasurer, H. B. Milmine; directors, C. E. Milmine, W. W. Bolles, L. S. Baumgardner, Alfred Milmine and D. B. Milmine.

The Leiter Syndicate, controlled by Joseph Leiter, and the Rothschilds, of Europe, have purchased the Rhode Island Locomotive Works, at Providence, R. I., and it will be operated by the International Air Power Company. The plant will be used for the manufacture of appliances for the New York Automatic Truck Company, and they will also continue the manufacture of steam locomotives.

Twining Campbell, superintendent of the Thomas Hewitt's Sons foundries, East Newark, has brought suit for a mandatory injunction restraining his employers from interfering with him in the performance of his duties. He is employed by the company under a contract, and he claims that by virtue of his agreement he has the right to employ and discharge men, and to accept or reject work, etc. The company answers that, as their employe, he must do what they direct. The suit is said to be in reality for the construction of the contract.

## Fires and Accidents.

A partial burning of the Lavell Foundry, at Anderson, Ind., caused a loss of $5,000.

Fire destroyed the foundry of J. D. Cornell, at New Orleans, with a loss of $30,000; insured.

Fire did $200 damage in the foundry of Thomas Carlin's Sons, at Pittsburg, Pa., January 21.

On January 5 the Co-operative Foundry, Nashua, New Hampshire, was slightly damaged by fire.

Fire caused a $2,000 damage to the foundry of the Ontario Wind Engine and Pump Company, Toronto, Ont.

Fire in the radiator department of the M. Steel Company's Works, at Springfield, O., caused a loss of about $3,000.

January 8 a small fire occurred at the Missouri Car and Foundry Company's foundry, St. Louis, Mo. Loss,not to exceed $1,000.

A slight fire in the foundry of the Easton Foundry and Machine Co., at Easton, Pa., destroyed patterns to the value of $600.

Louis Scheckner was seriously injured by an explosion of spelter at the Carterville Foundry and Machine Works, Carterville, Mo. His right eye and cheek were badly hurt.

The Vulcan Foundry, Newcastle, Pa., had one side blown down by the high winds that prevailed January 13. Damage was done to some of the machinery, and the aggregate loss is quite heavy.

Two Polish laborers were badly burned in the foundry of the Chicago Malleable Iron Works January 11th. They were carrying iron in a ladle, when a collision with other men caused the iron to spill. They were taken to the county hospital, and will recover.

Alexander Cuthbert, a molder at the Builders' Iron Foundry, Providence, R. I., was perhaps fatally burned on January 5. A chain-link broke, and the 20-ton ladle of molten iron tilted and spilt a lot of iron on the unfortunate man. He is badly burnt, but it is hoped he will recover.

## New Buildings and Enlargements.

An addition is being built to the Norristown Foundry, Norristown, Pa.

The Meeker Foundry Company, at Norwalk, Conn., will greatly enlarge its plant.

The E. W. Ross Company, of Springfield, O., will double the capacity of its foundry.

F. S. Lowell was granted permission to build a foundry, 30x36 feet, one story, at Council, Mass.

The Wilmington Malleable Iron Works will be enlarged by the erection of a new building, 64x76 feet.

The Alabama Steel and Shipbuilding Company, at Ensley, Ala., is erecting a foundry and machine shop.

The foundry of the American Steel Casting Company, at Chester, Pa., will give employment to 600 men.

The LeBaron Foundry Company, of Middleboro, Mass., has installed a new crane in the molding department.

The Syracuse (N. Y. Malleable Iron Works, recently burned, have been rebuilt, and is employing 250 men.

The Chicago Hardware Foundry Company is building at North Chicago a new foundry at a cost of $15,000.

The City Council of Keokuk, Iowa, has voted a bonus of $9,000 to induce Col. Chauncey H. Castle to revive the stove works of that city.

The James Leffel Water Wheel Company, Springfield, Ohio, will build a new foundry in the early spring. It will be double the capacity of the present one.

The Barnard & Leas Foundry, at Moline, Ill., has been doubled in capacity lately by extensions to the buildings, and by the installation of a new cupola, 55-inch diameter.

Graff & Co., stove manufacturers, of Pittsburg, have recently built a new plant at Monongehela City, Pa. The old plant at Sharon will be offered for sale at auction March 16.

A new building for the wood work and paint shop, 200x100 feet, is being erected by the D. M. Osborne Company, at Auburn, N. Y. The plant is running night and day to the fullest capacity.

The Youngstown Foundry and Machine Company has greatly enlarged its foundry by the addition of 50x50 feet, the foundry now being 150 feet long. A 20-ton crane has also been installed.

The Eclipse Foundry Company has been incorporated by Henry Lengfelder and others. The company has leased the property of the Standard Foundry Company, St. Louis, Mo., and have begun operations.

The American Steel Foundry Company, of St. Louis, is making extensive improvements to its works at Granite City, Ill. The new casting building will have a central span of 80 feet and wings of 60 feet, the total length being 400 feet.

Caskey Brothers, whose brass foundry at Newport News, Va., was destroyed by fire, will rebuild at a cost of about $125,000, the new construction including iron and brass foundries, 400x100 feet, fire proof. A 10-ton and a 25-ton traveling crane will be installed.

The Crane Company, of Chicago, has bought additional land to the value of $65,000, and will erect new buildings to cost a large sum. A foundry, 226x93 feet, will be erected at once, and other buildings later. The present foundry is 100x205 feet, five stories high, and turns out 70 tons of castings a day.

It is reported that the American Pipe and Foundry Company will double its capacity at Bessemer, at a cost of $200,000. They propose to establish there the largest pipe plant in the world. Their general offices or headquarters are now located at Chattanooga, Tenn., but it is said that they will probably remove to Birmingham, Ala., in the spring.

The Niles (O.) Boiler Company has purchased all of the machinery of the Rippel Foundry and Machine Company, Mt. Gilead, O., consisting of nearly 100 tons of improved foundry and machine shop equipments. It will be removed to Niles, O., immediately, where one building, 50x128 and one building 50x112 feet, will be erected in addition to the present boiler and tank shops. The company expects to be in position to turn out castings in 60 days.

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So long as your paper maintains its present standard of excellence I shall continue my subscription.

CHAS. C. HUNSBERGER.
Pencoyd, Pa.

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### Deaths.

Mr. William Rapp, a prominent molder of St. Louis, died December 18, aged 35 years.

At Cumberland, Md., Jabez Wilkinson, for many years foreman of foundry in McKaig's foundry, died, aged 79 years.

Archibald Hughes died at the home of his daughter, in New Haven, Conn., January 15, aged 81 years. He was foreman of a foundry in Hoydenville many years ago.

John Shaughnessy, Sr., died of pneumonia at his home in Scranton, Pa., January 8, aged 54 years. He had worked at molding for the Delaware, Lackawanna & Western foundry for a period of 30 years.

Nathaniel G. Gardner, for 33 years superintendent of the J. B. & J. M. Cornell Iron Works, of New York, died January 25, at his home in Westfield, N. J., from injuries sustained in a fall.

W. H. Bennett, formerly of the firm of Root, Bennett & Co., iron founders, Indianapolis, Ind., but who was stricken with apoplexy three years ago and then retired from business, died at his home January 16, aged 71 years.

James D. Clare, president of the Ohio Stove Company, and prominently connected with many manufacturing concerns, died after a short illness at the home of his daughter, in Columbus, Ohio, December 21, aged 79 years.

Lester Goodenough, of the firm of Lester Goodenough & Sons, brass founders, Bristol, Conn., died December 28, 78 years old. He was president of the Codling Manufacturing Company and was for many years a director of the Bristol Savings Bank.

John Decher, an employe of the Sloss Iron and Steel Company, of Birmingham, Ala., met with an accident which caused his death January 7. The roof of the casting house fell in and he was pinned down to the hot sand and burned to death.

Thomas Combe, who owns a large foundry and machine shop at Lambertville, N. J., was on a visit to friends in Plymouth, England, and dropped dead, late in December. This was his twentieth trip to the old country. His remains were shipped to Lambertville for interment.

Hon. Benjamin J. Cole, for 62 years past treasurer of the Cole Manufacturing Company, Laconia, N. H., died at that place January 18, aged 84 years. Mr. Cole was always a very active business man, identified with large interests in many lines, and held at various times offices of public trust.

James Bresland, president of the Home Stove Works, Chicago, died of heart failure January 19, aged 53 years. Mr. Bresland was a native of New York State and had been in the stove business for many years. He was one of the organizers of the Home Stove Works in 1887, and prior to that was foreman pattern fitter for Cribben & Sexton, Chicago. He served in the Civil War.

Mr. David Greene, secretary and treasurer of the Case Manufacturing Co. of Columbus, Ohio, died January 19, of a mysterious disease that had long baffled the skill of physicians. Mr. Greene was a graduate of Princeton College, and at the age of 20 entered the firm with which he was ever after the leading force. Twice burned out, the shops were rebuilt, the last time in 1893, and business was resumed in sixty days after the fire. Mr. Greene was of a noble and amiable character, and his demise is deeply felt by all his associates.

Anselm T. Nye is dead, at the age of 66 years. Mr. Nye was the managing partner of the stove foundry of A. T. Nye & Son. Mr. Nye has managed the business (left him by his father) since 1854, and under his management it has grown to be one of the largest and most substantial manufacturing concerns of southern Ohio. He was also a director of the Citizens' National Bank, of Marietta. He had been sick for less than a week, of paralysis, and died January 10.

## Here and There.

The consumption of Scotch pig for the year 1898 was 1,264,272 tons, or 33,000 tons more than in 1897.

The United States Mitis Company has brought suit against the Franklin Steel Castings Company, of Franklin, Pa., charging infringement of patent.

The Radford Foundry and Machine Company, of Baltimore, has just been incorporated, with Col. W. J. Kenderdine as president. The capital stock is not to exceed $25,000. They will manufacture all kinds of castings.

The A. Garrison Foundry Company, of Pittsburg, has in the sand a housing casting which, when completed, will weigh 34 tons. In lifting the mold, a chain 1¼ inches thick in the links was broken. The casting is to be used in a mill near Joliet, Ill.

It is reported that Samuel Thomas, of New York, is at the head of a syndicate which has secured control of a majority of the stock of the American Pipe and Foundry Company, with a view to cementing a syndicate controlling virtually all the cast iron pipe foundries in the United States. John W. Harrison, of St. Louis, is said to have disposed of his stock to Mr. Thomas and to have arranged for the transfer of enough stock to give Thomas control. This

company dictates the situation, because it owns the southern pipe foundries at Bessemer, Annistoon, Bridgeport and Chattanooga, and they are conceded to have the inside track in the export field, which now offers a particularly inviting field. Several of the large stockholders admit having received very flattering offers for their stock. The plan is said to be to issue $25,000,000 of stock on the aggregate plants, which represent a capital of $13,000,000.

Many methods for closing crack or pores in cast iron have been devised. Chemical or other products, such as sal-ammoniac, are often used to form iron salt, easily oxidizable, which in a short time gives a certain quantity of hydrated oxide of iron. This is made use of very often to stop up leaks which develop in metallic cylinders. This method is, however, a somewhat tedious one, several days being often times necessary to obtain satisfactory results—to the extent, at least, of entire absence from leakage. A method of closing cracks or pores has lately been devised by M. A. Demalght, of Brussels. The cylinder is filled with a certain quantity of perchloride of iron. The liquid is then compressed until globules appear on the external surface, when it may be regarded as impregnated with perchloride of iron right through as regards its thickness. Any remaining perchloride is then emptied out, and the cylinder wiped until the polished surface is again made brilliant.

## Trade Publications.

We have received from the Joseph Dixon Crucible Company, of Jersey City, N. J., an exceptionally beautiful calendar. In the picture an artist capped, golden-haired girl of sweet sixteen is thrusting a red rose to the beak of a fluffy little owl that is standing demurely upon a mounted globe, while at her right are various designs of the Dixon's American graphite pencils.

Bulletin H, of the Sturtevant Company, contains illustrations and descriptions of the numerous styles of electric fans made by that company. The different types of fans are designed for different purposes, as for cupolas, for ventliators and for conveying, etc. The motors and fans are "all one," and so occupy but little space, and their many excellent qualities have made them very popular.

Another booklet issued by the same company has for its title "Who Uses Mechanical Draft?" and its eighteen 5"x7" pages are filled with names of firms who use the Sturtevant fans.

## "Move Your Family West."

Mr. Geo. James, of Geo. James & Co., Seattle, Wash., sends us a newspaper clipping containing some remarks upon the eminent success of western shipbuilders, and advises, humorously, that the eastern founders who are engaged in an "everlasting struggle with shrinkage and chill!" go west and find rest therefrom. Following is the item:

The torpedo boat Rowan, built by Moran Bros., in Seattle, was given a trial trip Friday last and exceeded her contract speed 1.62 knots, making 28.97 knots an hour, or 33.36 miles. The success of the Rowan and of the battleship Oregon, which was built by the Union Iron Works, of San Francisco, are a great advertisement for the Pacific Coast builders of iron ships, and it is likely they will have their full share of such work in the future. An explanation has recently been advanced, and seems reasonable for the superiority of iron ships built on the Pacific Coast. It is that, owing to the even temperature of the climate, the different castings which go to make up a ship made at different seasons of the year are more nearly perfect in the sizes intended, and the whole fits better and is better when put together.—Chehalis Bee-Nugget.

## Graphite.

We have received from the Joseph Dixon Crucible Company a four-page pamphlet describing the nature, manufacture and uses of graphite. We did not know till we read this pamphlet that graphite was used for so many different purposes. The Joseph Dixon Company employs it principally in the manufacture of crucibles and "lead" pencils, and for making what would appear to be an everlasting paint.

## What They Say.

Please find $1.00 to pay for THE FOUNDRY for 1899. The January number alone is worth the price of a year's subscription.

J. M. MOHLIGEL & CO.,
Alma, Mich.

Until I change my business, my subscription to THE FOUNDRY will continue; in fact, write it with India ink, once for all.

V. W. DYKEMAN,
St. Johns, N. B.

## NOTICE!

**Advertisements in this column, 30 cents a line for each insertion About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.**
**Answers addressed to our care will be forwarded.**

### TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

---

WANTED—One good loam molder. Address Box 223, care THE FOUNDRY.

WANTED—Position as foreman of foundry. Ten years' experience as such in all kinds foundry work. Address Foundryman, Box 211, care THE FOUNDRY.

WANTED—A foundry foreman capable of handling a large variety of work, chiefly sanitary and heating. Address, giving full particulars and references, Box 219, care THE FOUNDRY.

WANTED—Position as foreman in machinery or jobbing foundry by experienced man; American; strictly temperate; good references. Address Foundryman, Box 214, care THE FOUNDRY.

WANTED—Position as foundry foreman in New England or Middle Atlantic States; at present foreman in shop with 40 molders, on engines and general machinery. Address Box 212, care THE FOUNDRY.

WANTED—Foundry foreman for shop making from 5 to 8 tons of architectural and general castings. Want a sober and competent man. Address, with references, KENTUCKY, Box 203, Care THE FOUNDRY.

WANTED—To correspond with firm in need of a foundry foreman; American, 34 years old, 10 years' experience in general foundry; light castings a specialty; good references. Address Box 210, care THE FOUNDRY.

WANTED—A foreman to superintend the molding department of a large brass foundry; good wages and constant employment. None but a thoroughly competent man need apply. Address Box 215, care THE FOUNDRY.

WANTED—Partner; live business man with $5,000 to invest in the foundry and machine business. A rare opportunity for a good heating engineer or practical foundryman. Address H. and H., Box 202, Care THE FOUNDRY.

WANTED—Foreman, or assistant foreman, for large stove foundry. Must be practical and energetic, and thoroughly understand foundry practice and management. State experience and age. Address Box 217, care THE FOUNDRY.

WANTED—position with some large foundry, as timekeeper, foundry clerk, bookkeeper or shipping clerk, by a young man with 7 years' experience with present employer. Competent and reliable. Address CLERK, Box 222, care THE FOUNDRY.

FOR SALE—(1) 84″ cupola, No. 9 Buffalo, 58″ Boston and No. 6 Sturtevant fan; No. 4 Roots blower, four-ton foundry ladle, (1) 10 and 2 two-ton hand, jib cranes, lot of wood-working and iron-working machinery. Address Thos. Carlins' Sons, Allegheny, Pa.

WANTED—Address. Superintendents and foremen of foundries will please send their names and P. O. address to the undersigned. Valuable information that will aid them materially in securing perfect work will be sent by return mail. Address Charles Wadsworth, 389 Cumberland st., Brooklyn, N. Y.

WANTED—To correspond with a party owning a foundry and machine shop who is in need of a first-class up-to-date foundryman and superintendent to take charge of the plant for a per cent of the profits, or would accept position as foundry foreman. Am a thorough mechanic, with highest references as to ability, sobriety and integrity. Address Box 213, care THE FOUNDRY.

WANTED—Foundry foreman in partially up-to-date, and desirous of being above and beyond date foundry; need know nothing of melting and mixing iron, but must have mechanical ability necessary to make cored castings ⅜″ thick and not 7-16 where ⅜″ is intended, as well as being able to run and care for other machines, and work systems to their ultimate conclusions. Address Box 218, care THE FOUNDRY.

FOR SALE—Foundry. Abundance of work guaranteed for the foundry and machine works. A cordial invitation given to come and examine the opportunity offered. Correspondence not solicited; $7,000,000 the output here of lead and zinc for 1898; for 1899 it will be much larger. Unlimited quantities of the finest building stone in the State here. Longest electric railroads in the world connect our cities and towns. For particulars call at the Carthage National Bank, Carthage, Jasper Co., Missouri.

---

I am more and more impressed with the value of THE FOUNDRY. It should be in the hands of every live patternmaker, for the information it contains relative to molding and foundry appliances.

JOHN M. RICHARDSON.
Auburn, R. I.

# BUY THE ORIGINAL AND BEST

We make the STANDARD facings and Blackings known the world over. ALL CRUDE MATERIALS ARE ANALYZED and thoroughly tested ere they enter the manufacture, so you will always get "value received" from us.

# THE

# S. OBERMAYER CO

CINCINNATI, O. Telephone 7873.

CHICAGO, ILL. Canal 308.

Direct telegraphic communications to our offices.
Cable address, "ESSO"—Cincinnati.

THE LARGEST AND MOST RELIABLE FOUNDRY SUPPLY HOUSE IN THE WORLD.

We have everything you need in your foundry—

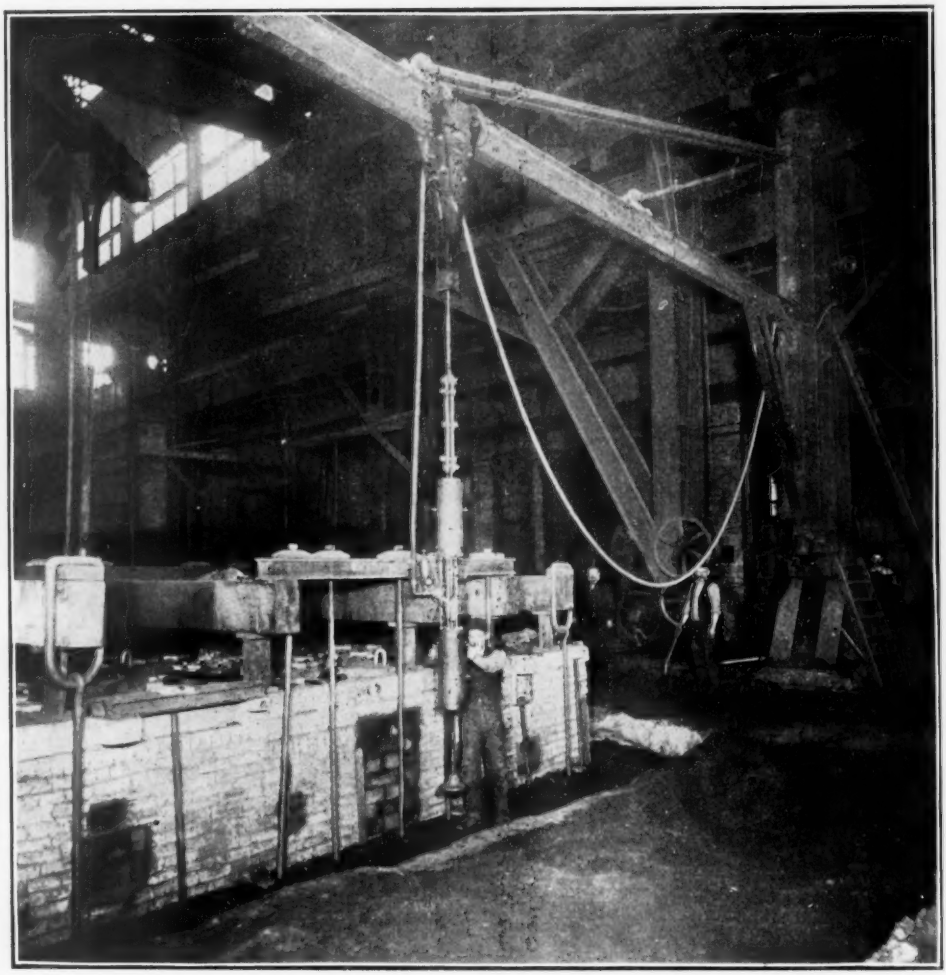
FACINGS, BLACKINGS, CORE WASH, BRASS SAND, CRUCIBLES, PLUMBAGO, SILVER LEAD, TALC, FIRE BRICK, MOULDING SANDS, ETC.

Also—

CUPOLAS, LADLES, CRANES, TUMBLING MILLS, MOULDING MACHINES, IRON FILLER, SHOVELS, RIDDLES, BRUSHES, BELLOWS, ETC.

Have you Catalogue No. 26? If not, write for same and mention "THE FOUNDRY."

# Cramp Pneumatic Rammer



Invented to save labor in ramming up a mold.

Swung upon a light crane attached to the side of the building or from a post.

A trolley gives it two motions, in-and-out and circular, covering every inch of surface in a radius of 25 or 30 feet.

Can be run by air or steam, compressed air preferable. With a pressure of about forty pounds it strikes 250 times a minute or as desired.

One man handles it with ease and does the work of a dozen by hand ramming.

The sand or dirt is packed with an even pressure.

The mold is secured beyond a doubt and saves metal by uniform ramming.

The mold is rammed up in one-third the time.

No well equipped Foundry can afford to be without this machine.

For further particulars, apply to

**J. W. Paxson Co.**

1021 North Delaware Avenue,
PHILADELPHIA, PA., U. S. A.

Foundrymen! Control the Gear Convoys' Portable Gear Molding Machine

# A NEW IDEA!

**Foundrymen! Control the Gear Business in Your Own Locality!**

**The day of costly patterns, destructive rapping, and teeth-with-draft is passing; the machine molded gear, made without pattern, and with draftless teeth is here to stay. Why let outsiders ship fine machine molded gears to your next door neighbor, and catch other work?**

UNIVERSAL GEAR MOLDING MACHINE. (GROVES' PATENT.)

The machine illustrated above is described as Universal, because it is perfectly adapted for the molding of Spur, Bevel, Helical, Staggered or Worm Toothed Gearing (internal or external) from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts, except tooth block,

# Groves' Portable Gear Molding Machine

**No Jobbing Foundry can afford to be without it. Others use it, why not you?**

This simple, economical and inexpensive appliance is adapted for molding the teeth of large gears from 32 inches up to 24 feet in diameter and any face; also rims of Belt and Rope-Driving Pulleys, Band and Fly Wheels, etc., doing away with large, expensive full patters and can be removed from the foundry floor in a few minutes after the mold is formed, thus leaving valuable space ready for other work.

**Apply for Price, etc., to the . . Exclusive Agents . . . . . .**

## J. W. PAXSON CO.

**1021 N. Deleware Avenue, PHILADELPHIA, PA.**

# Important to Users of India Silver Lead Facings

During the past fifteen months the price of Ceylon Graphite, from which India Silver Lead is made, has advanced so greatly at the mines in Ceylon that the ore now sells at more than double the old-time standard prices. The prices, therefore, for India Silver Lead Facings must now be advanced or adulterations resorted to. Adulteration by soapstone and similar materials cannot well be detected, even by an expert, without chemical analysis. It is therefore safe to say that where the price of India Silver Lead Facing is not advanced, adulteration has been resorted to, and the result will be unsatisfactory work.

Sooner or later this means to the foundry-man who has been using India Silver Lead, the alternative of higher prices or adulteration.

## ON THE CONTRARY.

The Dixon Company prepare the finest Silver Lead from American ore, which comes from their own mines at Ticonderoga, owned and run by the Dixon Company, which are the only successful graphite mines in the United States.

We are selling Ticonderoga Silver Lead all over the country with first-class results. There comes to us neither the need nor the temptation to advance our prices or to adulterate.

A postal card addressed to us as below asking for new samples of our best facings for dry sand, green sand, and loam work, will be carefully answered by sending postpaid, samples and quoting the old-time prices.

The above accurate information is given as a careful statement of the present situation, with the suggestion that you send us a postal card with your address and request for our samples.

To send this postal will cost you only the card, and you may learn something of serious value. State if the work is green sand or dry sand.

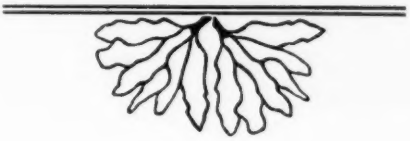
## JOSEPH DIXON CRUCIBLE CO.,

JERSEY CITY, N. J.

# Whitehead Brothers Company,

DEALERS IN

# Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Castings.**

*537=39 West 27th St.,*
*NEW YORK.*

**Providence Office,**
**42 S. Water Street.**

**Buffalo Office,**
**70 and 72 Columbia St.**

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

# We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

## Chicago Pneumatic Tool Co.,

**635 Monadnock Building, CHICAGO, ILL.**

P. C. COCHRAN, PRESIDENT.
J. H. WURTZ, SECRETARY.

J. R. LAUGHREY, TREASURER.
J. S. NEWMYER, MANAGER.

# WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

## 3500 Acres of Coal. 3500 Tons Daily Capacity.

300 30-TON GONDOLA CARS — 50 30-TON COKE CARS.

Shipments of Coal commenced November 23 1893.
" Coke " August 29, 1894.

| | | |
|---|---|---|
| Coal shipped during | 1893 | 3,750 Tons. |
| Coal and Coke shipped during | 1894 | 204,500 " |
| " " " | 1895 | 370,000 " |
| " " " | 1896 | 353,000 " |
| " " " | 1897 | 750,000 " |

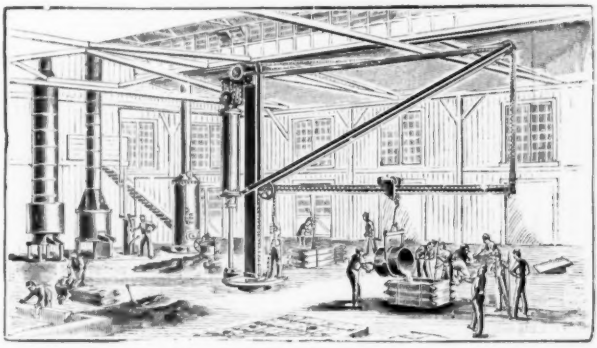
GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

# Say, Did You Notice It?

In last week's *Iron Age* they gave five pages to illustrating the latest fine new foundry. Oh! you must have seen it. And did you notice in that foundry they use nothing but swing cranes—not a traveler—all swing cranes, and four of them 25 tons capacity, too? If there was any excuse for a traveler in a foundry, it might be on a 25-ton crane because of top bracing.

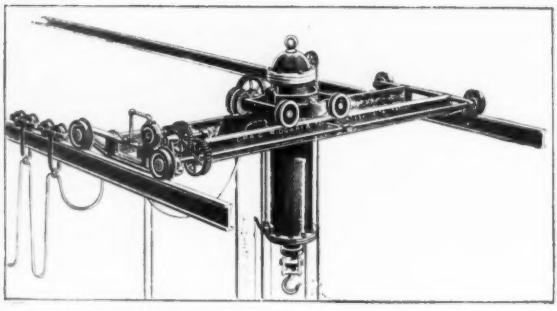
No, they are not Ridgway Cranes. The company don't know the Ridgway Crane or they would have had them quick enough. They are old-fashioned winding cranes, from all appearances, but, inferior as they are, with there noise and broken gear and slowness and danger, this concern is wide awake to know that for a foundry the only kind of cranes to use are swing cranes. Just mark that.



5-Ton Steam Hydraulic Crane in a Foundry.

We call your attention to it because it is a corroboration from and outside source of what we are forever harping upon—namely, that to equip a foundry with any other cranes than swing cranes is a most monumental mistake. We offer the Ridgway Crane as being the ideal swing crane. We would be willing to put a Ridgway Crane in the same foundry as the cuts show along-side of those old-fashioned, jerky, slow coach winding cranes, and guarantee the same molders for same wages to turn out about 50 per cent. more work. Be sure and note the revelation we will make to you next week in this card.

## AIR HOISTS.



Well, this time, don't know as we have much to say about Oil-Governed Hoists. The trouble with us is to get them made fast enough. Couldn't make you a prompt delivery of one now at any price. People are finding it out and they want them.

## "PLEASE TAKE THE ELEVATOR."

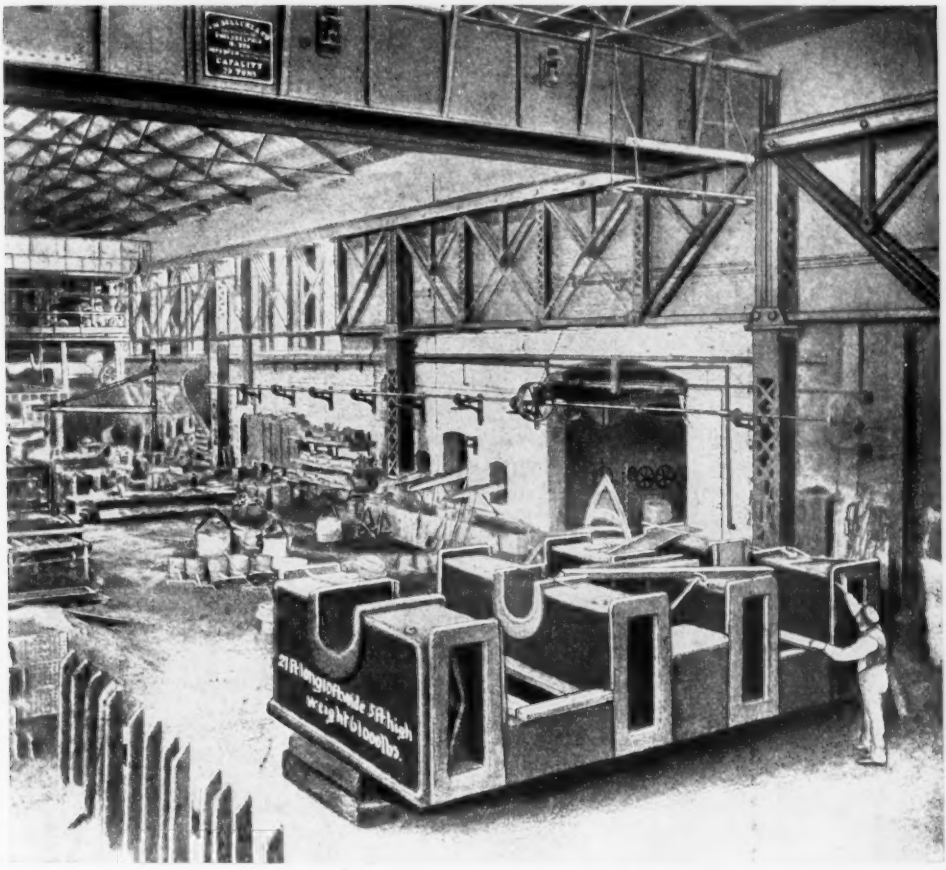
**Best shops everywhere are putting them in.**

## CRAIG RIDGWAY & SON, COATESVILLE, PA.

# William Sellers & Co. Incorp.

PHILADELPHIA.

# MODERN FOUNDRY MACHINERY

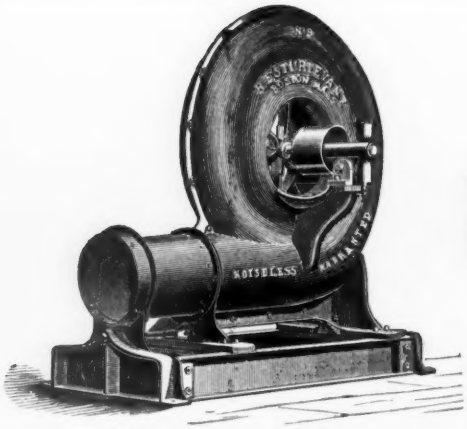


In the last issue of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.




Blower on Adjustable Bed.

# THE STURTEVANT STEEL Pressure Blowers,

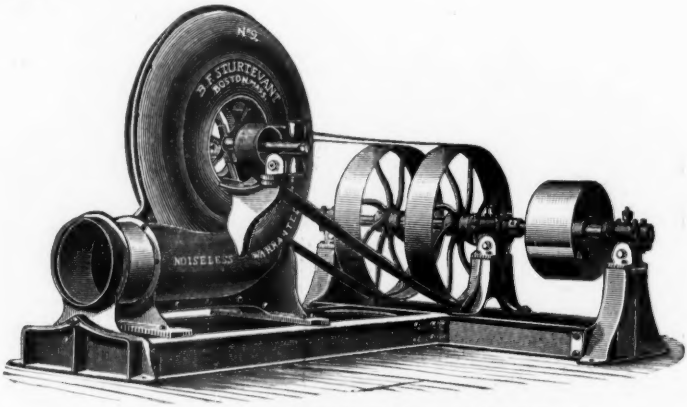
—FOR—

Cupola Furnaces and Forge Fires.

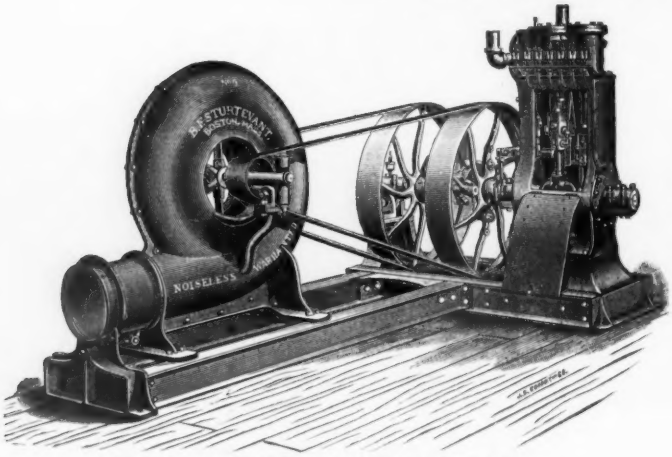
## BLOWERS

Furnished without Bed with Separate Countershaft

## BLAST GATES




Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

## BLOWERS

WITH

THE STURTEVANT

Direct Connected

## Electric Motors

Send for Catalogue.

## B. F. STURTEVANT CO.,

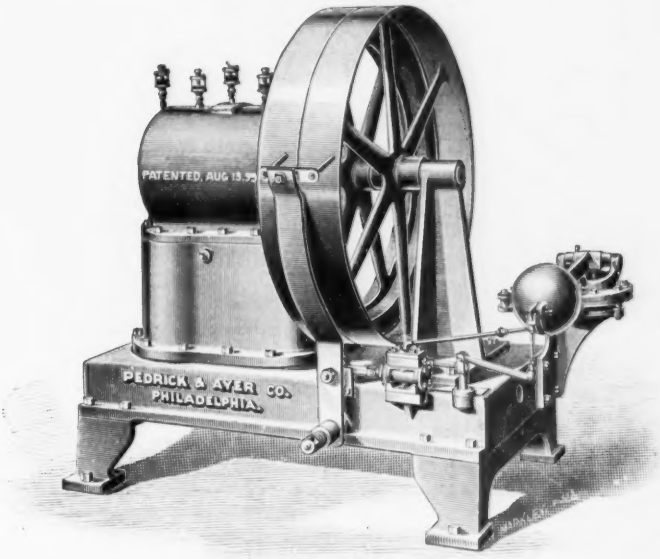
**BOSTON, MASS.**

131 Liberty Street, NEW YORK, 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.

STOCK CARRIED AT BRANCHES.

# Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.

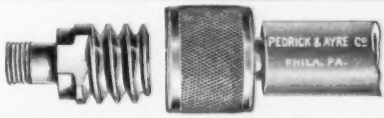



**Straight Lift Hoist.** **Built in two sizes, Nos. 1 and 2.**

| No. | Size of Cylinders in inches | Revolutions per Minute. | Cubic Feet of Free Air | Horse Power Required. | Size of Pulleys in inches | Shipping Weight of Compressor | Floor Space in inches | Telegraphic Symbol |
|---|---|---|---|---|---|---|---|---|
| 1 | 11x 6 6x 6 | 100-160 | 32- 50 | 2-3½ | 40x5 | 2875 lbs. | 60x40 | Parian |
| 2 | 15x10 8x10 | 90-120 | 90-120 | 9-15 | 60x6 | 5370 lbs. | 76x60 | Parish |

**HORIZONTAL HOIST.**

PAT. SEPT. 4TH 1894.




**AIR HOSE COUPLING**

**For ½ inch, ¾ inch and 1 inch Hose.**

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

**Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.**

# PEDRICK & AYER CO.

## SPRING GARDEN STATION, PHILADELPHIA, PA.

**Manning, Maxwell & Moore,** *Sole Agents,* 111-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

Crucible.

ROBT. J. TAYLOR & SON

COR. 19th & CALLOWHILL ST. TRADE MARK. PHILA.

Crucible

Dipper.

Cover.

Stopper.

# Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

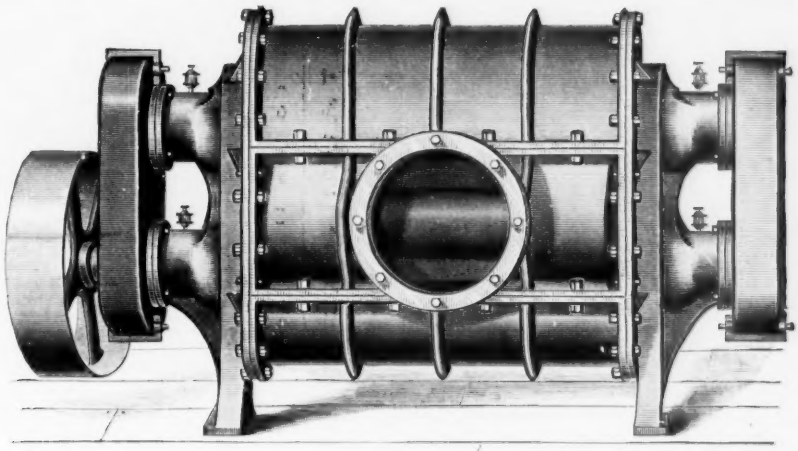
We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

## We make All Sizes, from 8 oz. to 2 ton Capacity.

# ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

# The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

**FOUNDRY BLOWERS**

## High Pressure Blowers

**GAS EXHAUSTERS**

## Exhausters for Hot Gases

**The GREEN Gives the Most Value for a $.**

# Wilbraham Baker Blower Co

**2518 Frankford Ave. PHILADELPHIA, PA.**

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES

Over 12,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

# FOUNDRIES

**PORTABLE, SELF-CONTAINED, AUTOMATC.**

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

## Now in Valuable Use With Hundreds of Foundries,

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**EDWARD ROBINSON, Sole Proprietor.**

44-46 WASHINGTON STREET, NEW YORK.

ROSS MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, 1896.

*The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:*

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

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ROSS-MEEHAN FOUNDRY CO.
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Established 1872. Incorporated 1895.

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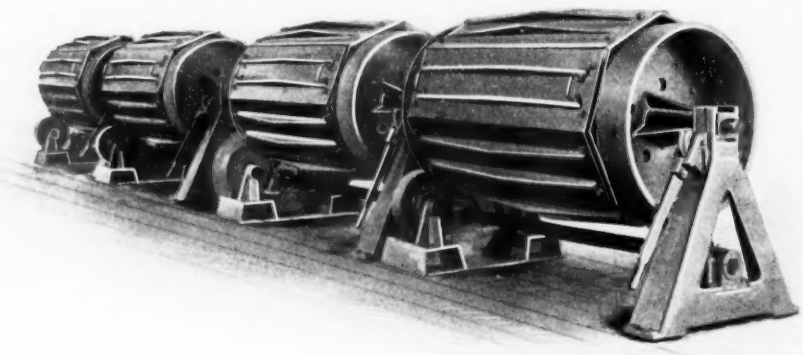

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AS MANUFACTURED EXCLUSIVELY BY THIS COMPANY.

THESE tumblers were furnished for a well known malleable foundry and an additional order for twice the number has since been placed with us. You should investigate the merits of these and our other types of tumblers. Try the WHITING CAR WHEEL CLEANING MACHINE and save money.

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FOR ANY SERVICE.

THE WHITING CUPOLA.
THE AVERY MOLDING MACHINE.

COMPLETE FOUNDRY EQUIPMENTS.
ENGINEERS AND DESIGNERS OF FOUNDRIES.

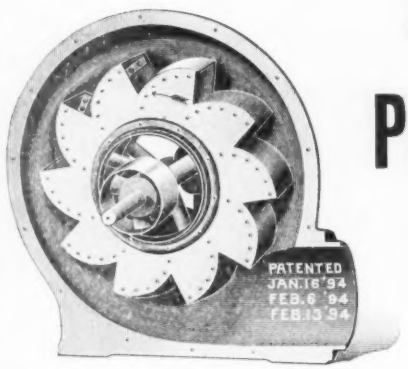
Prices and Catalogues if requested.

A BUFFALO BLOWER—Enough Said.

# ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 26 |
| Addy & Co., Matthew | 29 |
| American Glutrose Works | 4 |
| Ayers, E. M. | 19 |
| Barnett, Estate of Oscar | 26 |
| Berlin Iron Bridge Co | 27 |
| Big Four R. R. | 27 |
| Brooklyn Fire Brick Works | 25 |
| Buffalo Forge Co. | 17 |
| Case Mnfg. Co. | 23 |
| Chicago Pneumatic Tool Co. | 6 |
| Clinton Iron & Steel Co. | 25 |
| Connersville Blower Co. | Back Cover |
| Cornell, J. B. & J. M. | 18 |
| Cowles Electric Smelting and Aluminum Co. | Inside Back Cover |
| Dayton Coal & Iron Co. | 29 |
| Diamond Machine Co. | 28 |
| Dixon Crucible Co., Joseph | 4 |
| Domhoff & Joyce Co., The | 29 |
| Garden City Sand Co. | 21 |
| Gobeille Pattern Co. | 28 |
| Goodrich & Co., F. A. | 29 |
| Gould & Eberhardt | 24 |
| Hanna & Co., M. A. | 29 |
| Heyl & Patterson | 20 |
| Hussman Crucible Co. | 24 |
| Irwin & Co., James | 23 |
| Kelly & Co., T. P. | 22 |
| Mack, Thomas | 29 |
| McCormick & Co., J. S. | 21 |
| McCullough-Dalzell Co. | 15 |
| Millett Core Oven Co. | 19 |
| Mohr, J. J. | 29 |
| Miller, Wagoner, Fieser & Co. | 29 |
| Obermayer Co., The S. | Inside Front Cover and Page 1 |
| Paxson Co., J. W. | 2 and 3 |
| Pedrick & Ayer | 11 |
| Pickands, Brown & Co. | 29 |
| Pilling & Crane | 29 |
| Pridmore, Henry E. | 29 |
| Rand Drill Co. | 26 |
| Ridgway & Son, Craig | 8 |
| Rogers, Brown & Co. | 29 |
| Roots Company, P. H. & F. M. | Colored Insert |
| Sellers & Co., Wm. | 9 |
| Smooth On Mnfg. Co. | 13 |
| Springfield Facing Co. | 25 |
| Springfield Foundry Co. | 23 |
| Stevens, F. B. | 30 |
| Stevenson, Field & Co. | 29 |
| Stewart, W. H. | 25 |
| Stover Manufacturing Co. | 20 |
| Stow Manufacturing Co. | 28 |
| Sturtevant Co., B. F. | 10 |
| Superior Charcoal Iron Co. | 24 |
| Tabor Mnfg. Co. | 28 |
| Taylor & Son, Robert J. | 12 |
| Ward & Nash | 26 |
| Washington Coal & Coke Co. | 7 |
| Wells Light Mnfg. Co. | 14 |
| Whitehead Bros. Co. | 5 |
| Whiting Foundry Equipment Co. | 16 |
| Wilbraham Baker Blower Co. | 13 |



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**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

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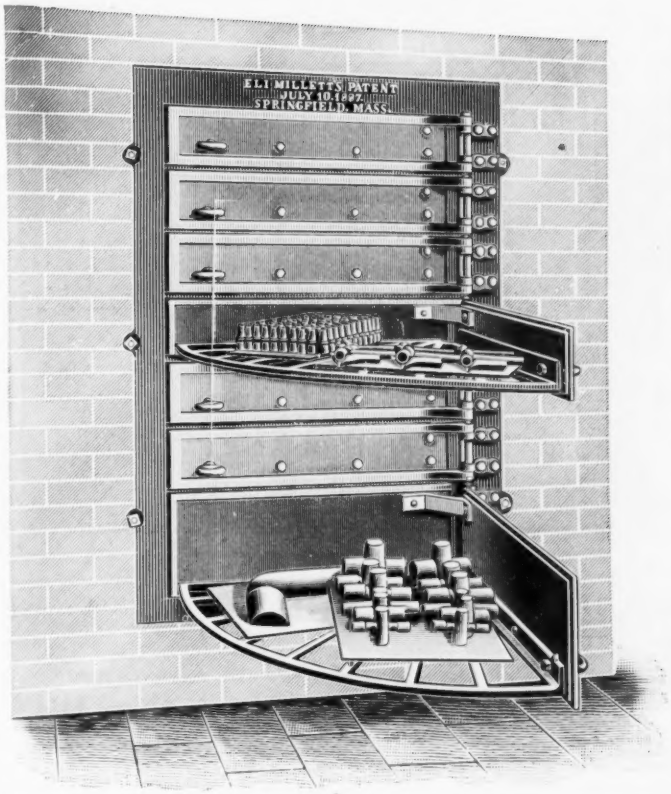


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**Double Doors,**
One closing the oven when the other is open.

**THE BEST IN THE WORLD**

No Foundry using small cores can afford to be without it.

Over two hundred in use.

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**Millett Core Oven Co.**

BRIGHTWOOD, MASS.

*These Ovens can be seen in the show rooms of the S. OBERMAYER CO., Chicago or Cincinnati, or the J. W. PAXSON CO., Philadelphia, Pa.*

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handle anything as a side line, it is liable to be neglected and attended to only when there is nothing else to claim attention.

This is as much true of molding sand as anything else. Carelessness in selection and mining will cause the foundryman untold annoyance later on.

We put our whole time into the mining and shipping of molding sand. We are specialists in our line and you know the specialist is the man who gives satisfaction both in price and quality.

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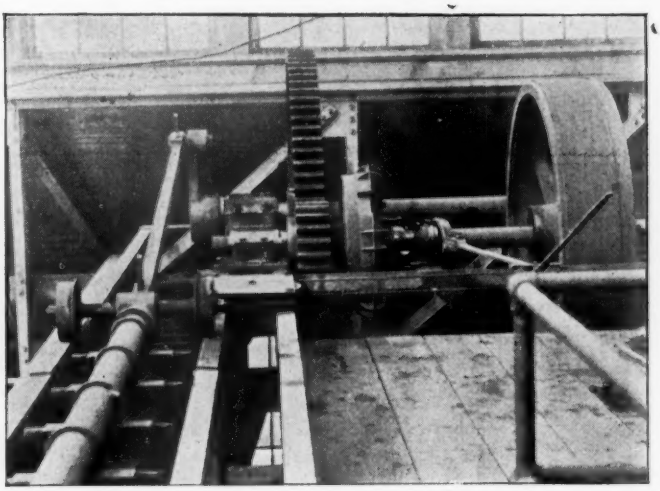
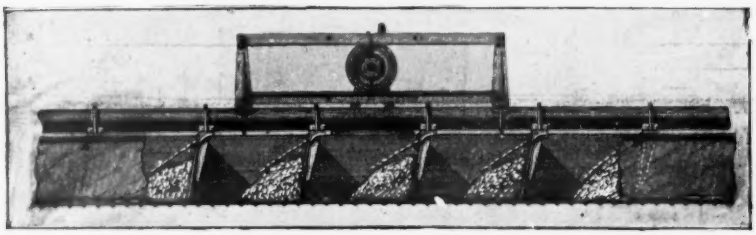
SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

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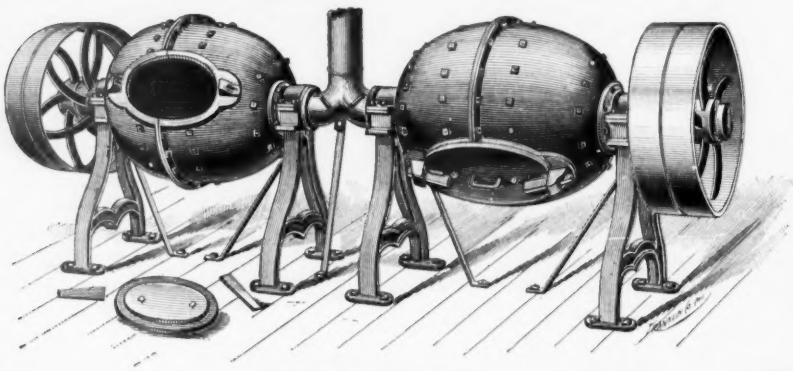
**Complete Installations.**



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# Stover's IMPROVED EXHAUST Tumbling Barrels

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Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

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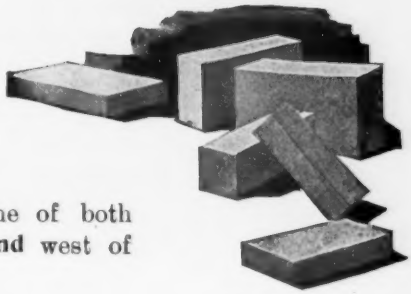
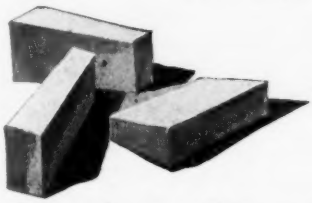
By placing your orders for **Molding Sand** early you get **more for your money** than you do later on when the damp weather sets in.



**REMEMBER** we have the largest line of both **Fine, Medium and Heavy Sand** west of Philadelphia.



**"FRANKLIN CROWN," Cupola Blocks and Fire Brick** always in the lead as a reliable product and **fully guaranteed.**

**Garden City Sand Co.,** * * SECURITY BUILDING, CHICAGO.

Telephone M. 5102 or 5138.

DO YOU MAKE LIGHT OR HEAVY

## Dry Sand and Skin Dried Work?

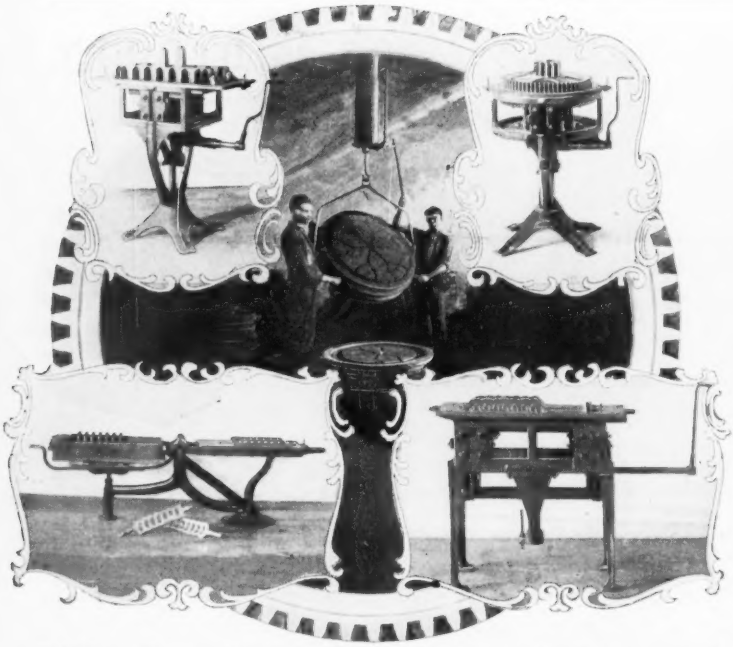
IF SO, YOU SHOULD USE

## McCORMICK'S EXCELSIOR BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

**J. S. McCORMICK CO., PITTSBURG, PA.**



Rights to use these machines for molding malleable iron or steel castings are reserved.

## In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

## Which do you wear most

your thinking cap or your working cap? The foundryman who studies to save himself labor and expense, who strives to have his castings make the best possible appearance, finds nothing so helpful as

## Kelly's Plumbago

It does the work on all grades of castings and a dollar's worth of it goes further than a dollar's worth of any other man's plumbago.

Samples, if you write for them.

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HIGH GRADE FLUOR SPAR FLUX
FOR IRON FOUNDRIES
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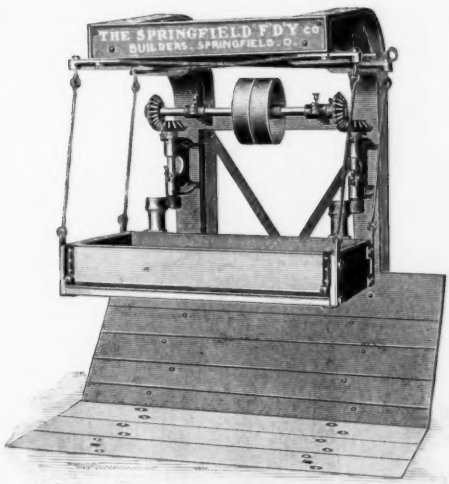


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BOTH HAND AND BELT POWER.

These are the Best, Simplest, Most Durable and Most Easily Operated Sand Riddling Machines made. For full particulars and references, address,

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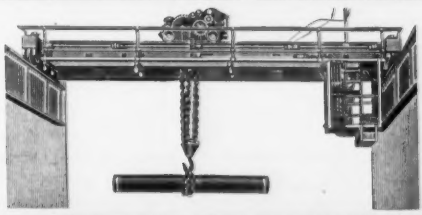

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## GLUTROSE

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**Sole Manufacturers.**

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# PLUMBAGO CRUCIBLES

FOR MEN THAT

**UNDERSTAND**

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

## Ceylon Plumbago

PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

**We keep it for sale.**

## Hussman Crucible Co.

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*Dear Sir*:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

**Price Low**

Send to

## GOULD & EBERHARDT, NEWARK, N. J.

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THE Molder who not only puts up his regular day's work, but takes interest enough in his employer's welfare to notice when he can save the firm a little that might be wasted, is the one who in the end is sure to gain by it. If you have some little improvement that will save time or expense, explain it to your foreman and do what you can to make the shop turn out good work so they can compete with other shops. Thousands of brass molders have decided that the best charcoal facing or parting ever used is manufactured by Springfield Facing Co. If you do not find it in your shop, it is your duty to tell your boss about it. Tell him we will send a sample barrel and if not entirely satisfactory they need not pay for it. Our Stove Plate Charcoal also leads the market. : : : : : : :

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THE FOUNDRY

If you want
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to read your "AD"
Place it Here.

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"FAIR DEALING" Their Motto.

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INSPECTED FOUNDRY IRONS . . . . .

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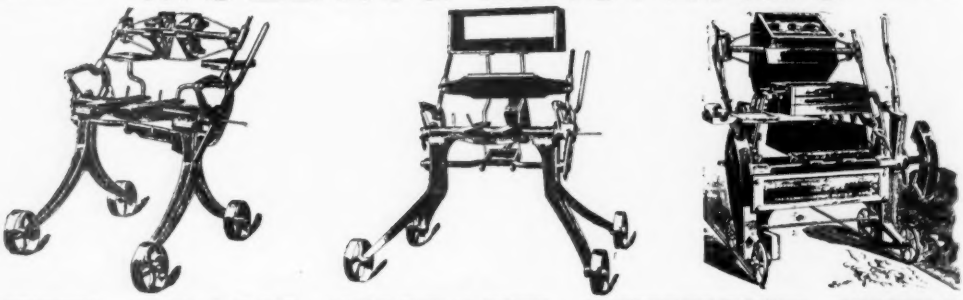

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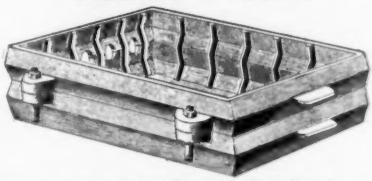

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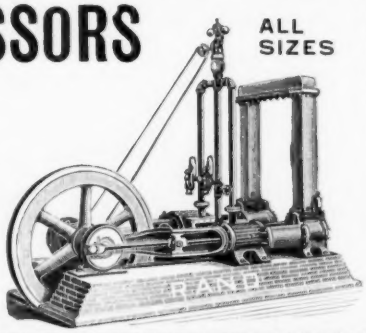


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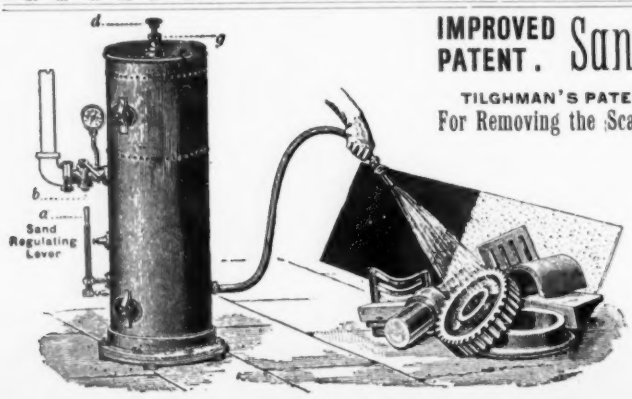


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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

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from financial loss for the man who will persist in throwing castings away simply because . . they contain a small hole or leak.

SMOOTH ON will cure permanently 90% of all the defects found in castings. It will stick to the casting till doomsday and even experts cannot tell the difference between a perfect casting and one made perfect by SMOOTH ON.

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OF THREE HUNDRED PAGES ILLUSTRATING AND DESCRIBING A LARGE NUMBER OF
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Is now ready and will be sent on application.

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PORTABLE, AIR-POWER, MACHINES,

**USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.**

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FOR ALL PURPOSES.

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**PORTABLE EMERY GRINDER**

Take the tool to the work and save heavy handling.

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## THE GOBEILLE PATTERN COMPANY

(PROMPT AND RELIABLE)

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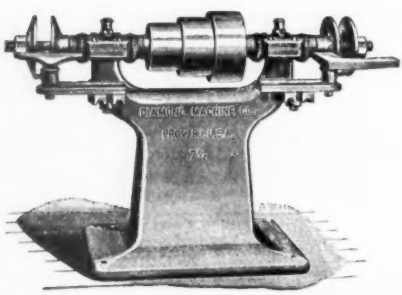

No. 7½ GRINDER.

## *This Grinder*

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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## Buy the Original and Best!

We make the Standard Facings and Blackings. **All Crude Materials are analyzed** and most thoroughly tested ere they enter the manufacture.

## Therefore a Pointer

**Please write us for Samples and Prices. All the Blackings we sell are MADE UNDER OUR OWN SUPERVISION and only one quality—**

## The Best!

**Our Facings and Blackings are Guaranteed**

**Not to Run Before the Metal,**
**Not to Stick to the Tools,**
**Not to Cling to the Pattern,**
**Not to Pull Off the Face of the Mold,**

BUT TO PRODUCE

**A Bright, Smooth, Clean Casting.**

. . . THE . . .

# S. Obermayer Co.

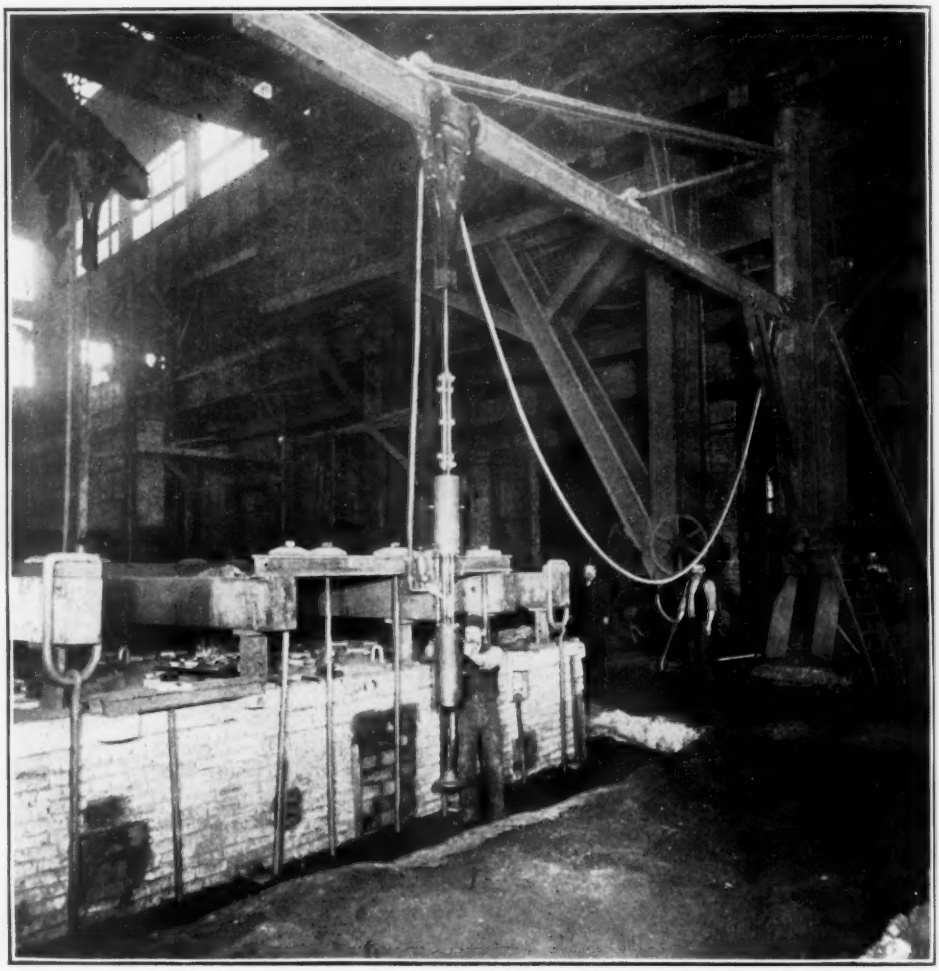
CINCINNATI, O.
CHICAGO, ILL.

*"EVERYTHING YOU NEED IN YOUR FOUNDRY."*

**Bituminous or Sea Coal Facing**

**From our Larimer Plant At the Lowest Prices that are now being offered . .**

# Cramp Pneumatic Rammer



Invented to save labor in ramming up a mold.

Swung upon a light crane attached to the side of the building or from a post.

A trolley gives it two motions, in-and-out and circular, covering every inch of surface in a radius of 25 or 30 feet.

Can be run by air or steam, compressed air preferable. With a pressure of about forty pounds it strikes 250 times a minute or as desired.

One man handles it with ease and does the work of a dozen by hand ramming.

The sand or dirt is packed with an even pressure.

The mold is secured beyond a doubt and saves metal by uniform ramming.

The mold is rammed up in one-third the time.

No well equipped Foundry can afford to be without this machine.

For further particulars, apply to

**J. W. Paxson Co.**

1021 North Delaware Avenue,
PHILADELPHIA, PA., U. S. A.

A NEW IDEA! Foundrymen! Control the Gear Cyoxes' Portable Gear Molding Machine

# A NEW IDEA!

**Foundrymen! Control the Gear Business in Your Own Locality!**

The day of costly patterns, destructive rapping, and teeth-with-draft is passing; the machine molded gear, made without pattern, and with draftless teeth is here to stay. Why let outsiders ship fine machine molded gears to your next door neighbor, and catch other work?

[UNIVERSAL GEAR MOLDING MACHINE. (GROVES' PATENT)

The machine illustrated above is described as Universal, because it is perfectly adapted for the molding of Spur, Bevel, Helical Staggered or Worm Toothed Gearing (internal or external) from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts, except tooth block,

# Groves' Portable Gear Molding Machine

**No Jobbing Foundry can afford to be without it. Others use it, why not you?**

This simple, economical and inexpensive appliance is adapted for molding the teeth of large gears from 32 inches up to 24 feet in diameter and any face; also rims of Belt and Rope-Driving Pulleys, Band and Fly Wheels, etc., doing away with large, expensive full patters and can be removed from the foundry floor in a few minutes after the mold is formed, thus leaving valuable space ready for other work.

**Apply for Price, etc., to the . . Exclusive Agents . . . . . J. W. PAXSON CO. 1021 N. Deleware Avenue, PHILADELPHIA, PA.**

# 50 Years Ago!

**50 years ago Joseph Dixon received the above medal for Crucibles of an Excellent Quality.**

THAT wasn't the first nor the last medal received, as the **Dixon Crucibles** have won medals and testimonials from all parts of the world, during the seventy years they have been made.

**Seventy years of experience** and the best equipped factory in the world explain the reason why we are able to make the best black lead crucibles in the world.

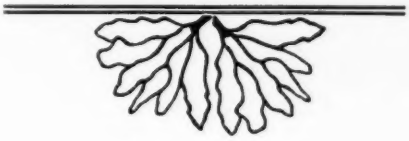
## Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

# Whitehead Brothers Company,

DEALERS IN

# Molding Sand



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PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Castings.**

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# We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

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**635 Monadnock Building, CHICAGO, ILL.**

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**3500 Acres of Coal.**

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300 30-TON COAL CARS

50 30-TON COKE CARS.

**Foundry Coke Our Specialty.**

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N. P. HYNDMAN, SALES AGENT.

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That's what the newspapers say.

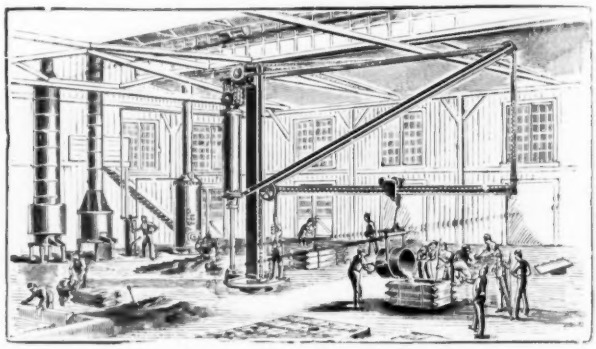
How much more a pound are you getting for castings?

Added one-tenth of a cent to that bid the other day and lost the contract, eh?

Pig iron is from fifty cents to a dollar a ton higher and yet you are selling castings at same old figures.

Reckon you would like to see some good for you in the "boom" the papers are talking about.

Well, here's the road to it. You have lots to do even if the prices are no better. Such being the case, get Ridgway Cranes for doing the work, and you will make money at the old price per pound by the saving the Ridgway Cranes will make in the cost of castings. Some of our customers say, with the Ridgway Cranes the same molders will turn out fifty per cent. more work for the same wages. That's a mighty big save if it is true. At any rate, hundreds of the best establishments all over the country have Ridgway Cranes and are continually getting more of them. They must be somewhere near what we claim for them as money makers. If you are a smart man, you will investigate a machine claiming so much and keeping continually at it.



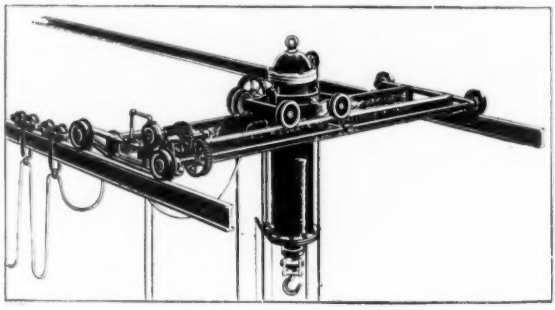
5-Ton Steam Hydraulic Crane in a Foundry.

## HYDRAULIC AIR HOISTS.

That's really a misnomer, but it is a good name. Machine goes by Air, hydraulic regulates the motion and makes a perfect air hoist.

There is no machine we know of so easy to try as an Air Hoist. All you have to do is to hang it up and connect the hose. Get the Ridgway Safe and Gentle Hoist and try it.

**Just One** in use in your shop will tell the whole story. Best shops are getting them.



## "PLEASE TAKE THE ELEVATOR"

**Let Your Steam Pipe Lift Your Stuff.**

## CRAIG RIDGWAY & SON, COATESVILLE, PA.

**CHAS. G. ECKSTEIN, 8 Kaiser Wilhelmstr., Berlin, Germany.**

There are Two Kinds of

ROTARY PRESSURE

BLOWERS

# THE ROOTS

AND OTHERS

OUR BLOWERS . . . . .

represent all the "up-to-date" ideas and embody (what no other . . . . blower can) forty years of experience in the construction of this type of machine . . . . . .

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

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AND AMERICAN GAS COMPANY,

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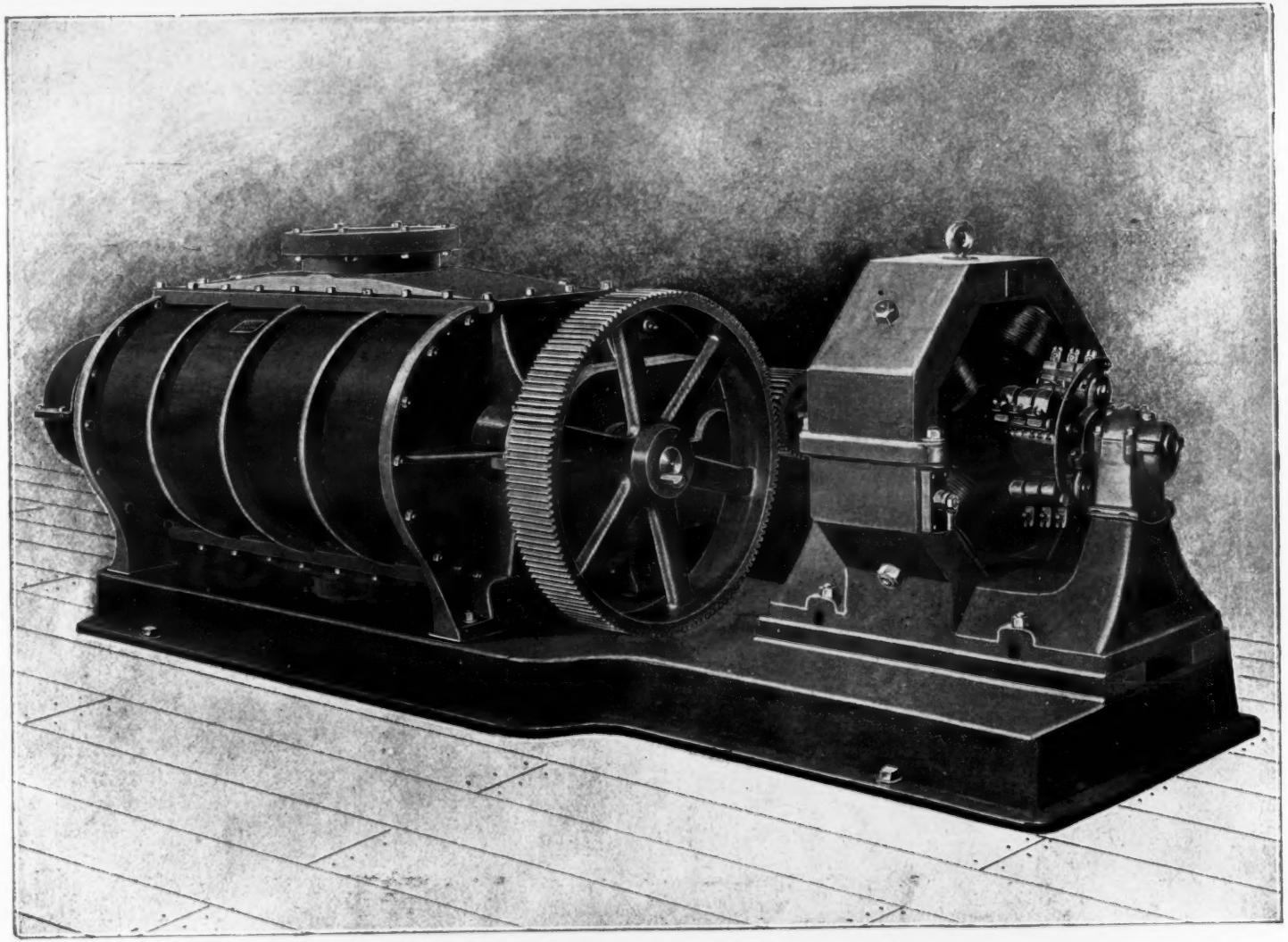

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.


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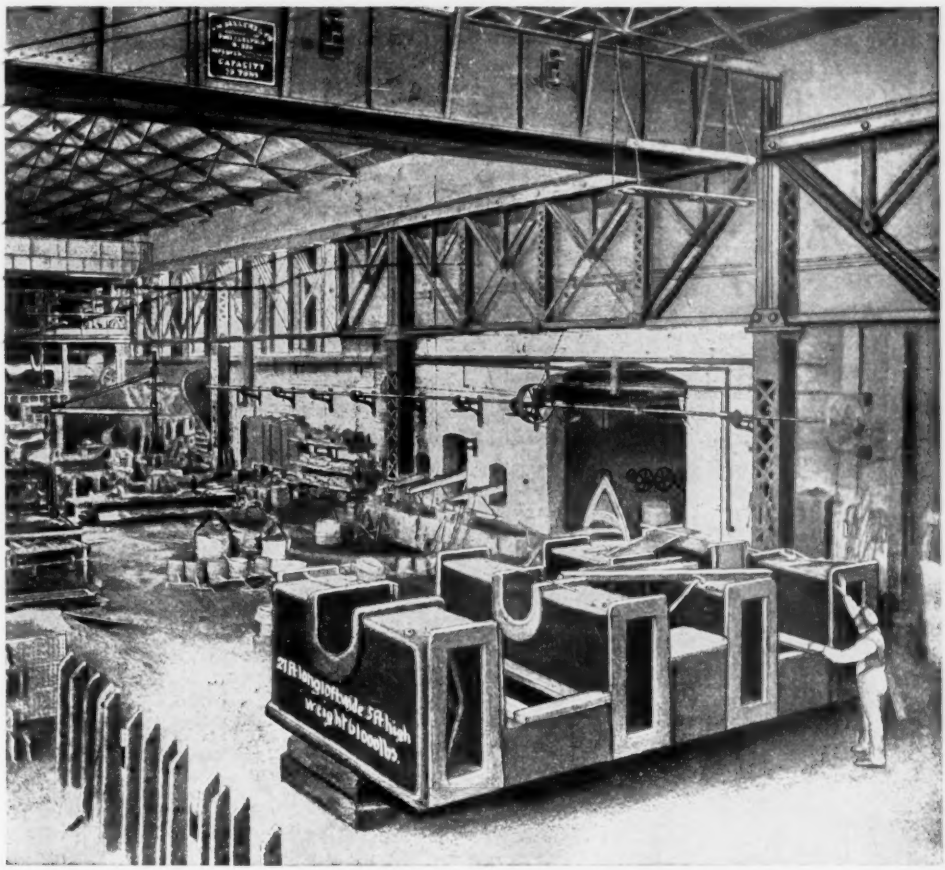
# MODERN FOUNDRY MACHINERY

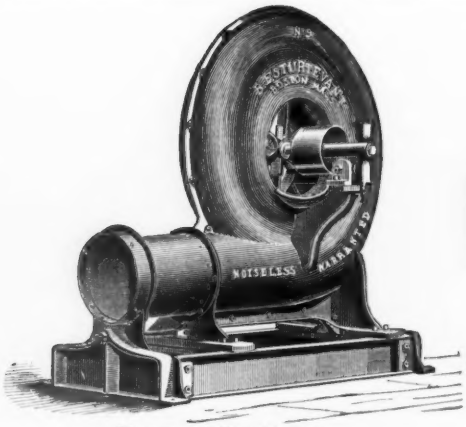


In former issues of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.




Blower on Adjustable Bed.

# THE STURTEVANT STEEL Pressure Blowers,

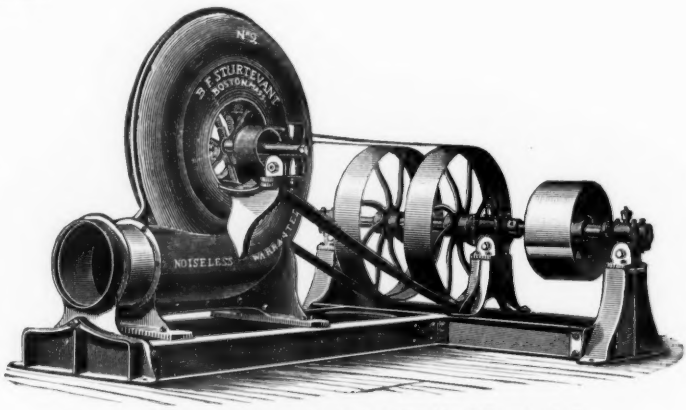
—FOR—

Cupola Furnaces and Forge Fires.

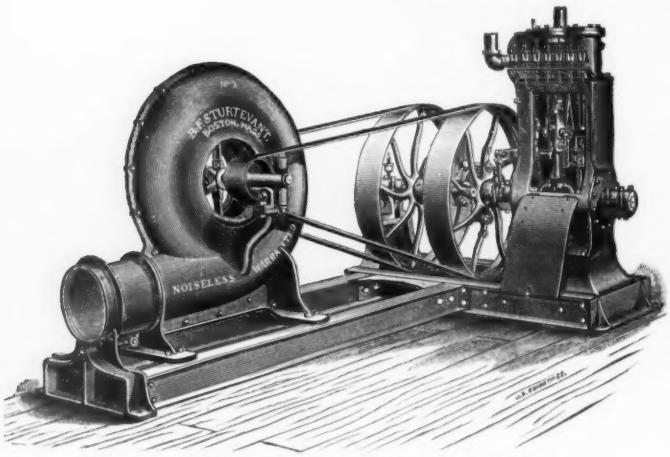
## BLOWERS

Furnished without Bed with Separate Countershaft

## BLAST GATES




Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

## BLOWERS

WITH

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Direct Connected

## Electric Motors

Send for Catalogue.

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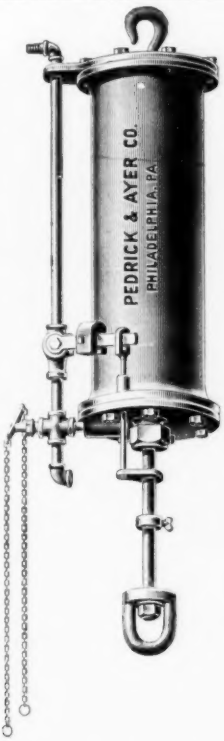
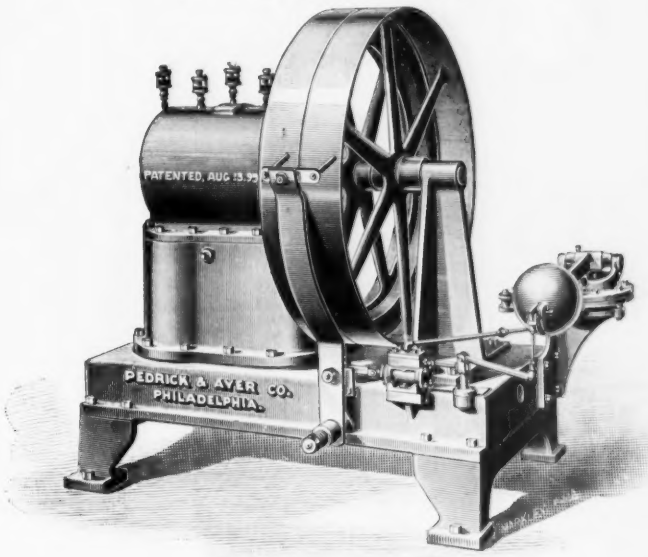
STOCK CARRIED AT BRANCHES.



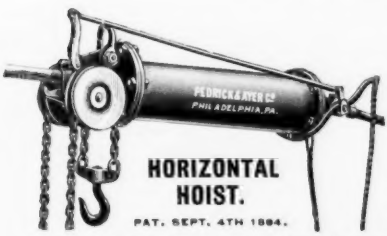

# Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.




**Straight Lift Hoist.** **Built in two sizes, Nos. 1 and 2.**

| No. | Size of Cylinders in inches | Revolutions per Minute. | Cubic Feet of Free Air | Horse Power Required. | Size of Pulleys in inches | Shipping Weight of Compressor | Floor Space in inches | Telegraphic Symbol |
|---|---|---|---|---|---|---|---|---|
| 1 | 11x 6 6x 6 | 100-160 | 32- 50 | 2-3½ | 40x5 | 2875 lbs. | 60x40 | Parian |
| 2 | 15x10 8x10 | 90-120 | 90-120 | 9-15 | 60x6 | 5370 lbs. | 76x60 | Parish |




**HORIZONTAL HOIST.**
PAT. SEPT. 4TH 1894.

**AIR HOSE COUPLING**
**For ½ inch, ¾ inch and 1 inch Hose.**

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

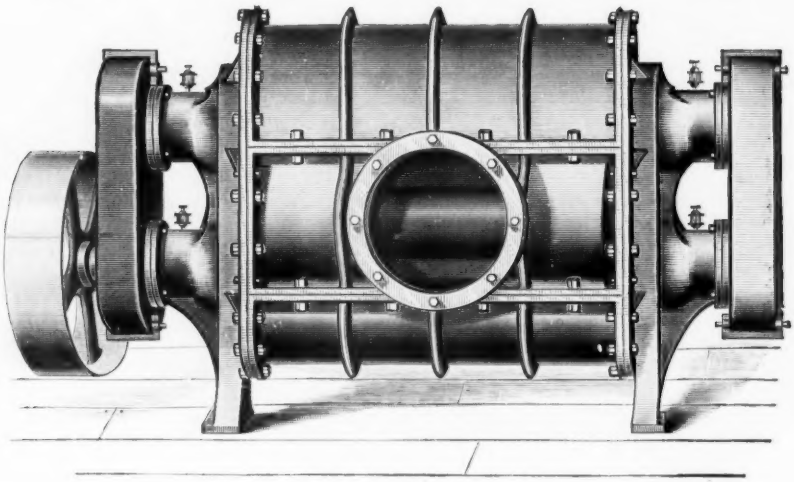
**Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.**

# PEDRICK & AYER CO.

## SPRING GARDEN STATION, PHILADELPHIA, PA.

**Manning, Maxwell & Moore,** *Sole Agents,* 111-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

# The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

## High Pressure Blowers

GAS EXHAUSTERS

## Exhausters for Hot Gases

**The GREEN Gives the Most Value for a $.**

# Wilbraham Baker Blower Co

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Over
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in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

# FOUNDRIES

**PORTABLE, SELF-CONTAINED, AUTOMATIC.**

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

## Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

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## THE WELLS LIGHT M'F'G. CO.,

**EDWARD ROBINSON, Sole Proprietor.**

**44-46 WASHINGTON STREET, NEW YORK.**

ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1899.

*The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:*

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

In the Plumbago Line we have Four Winners

Send for Free Samples

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Pure Ceylon.

# Corona Plumbago

Cheap but Good.

# C. F. M. Founders' Perfect Wash

Best in the World.

# Corona Wash

Good but Cheap.

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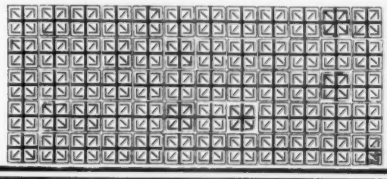
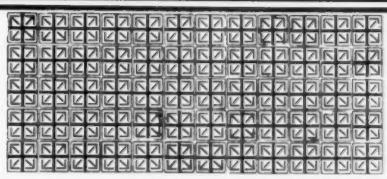


# CRUCIBLES



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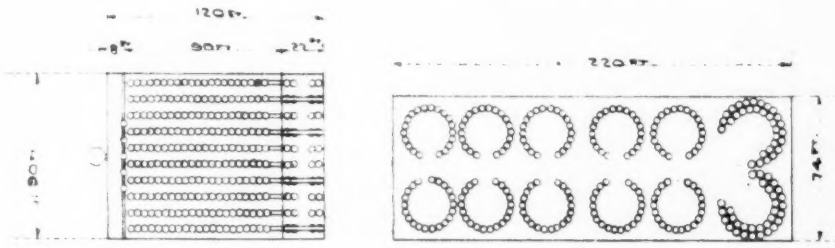
# CAST IRON CHILLED CAR WHEELS

PRONOUNCED SUPERIOR TO STEEL TIRED WHEELS.
IN UNIVERSAL USE ON ALL RAILROADS IN U. S.

Manufactured Most Economically With

# THE WHITING SYSTEM

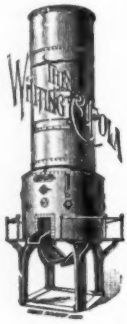
Under the Old Method 50 per cent. more space is required than with the Whiting.



THESE PLANS ARE DRAWN TO SAME SCALE.

A Ten-Floor Plant of THE WHITING SYSTEM; average daily capacity, 210 wheels. Molding and pitting area, 10,800 square feet.

A Ten-Floor Plant of any JIB CRANE SYSTEM, HAND, HYDRAULIC or BELT POWER; average daily capacity, 200 wheels. Molding and pitting area, 16,250 square feet.



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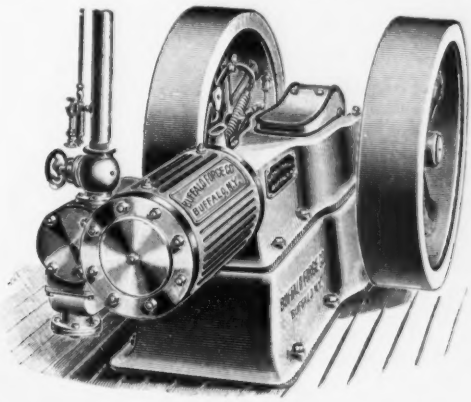
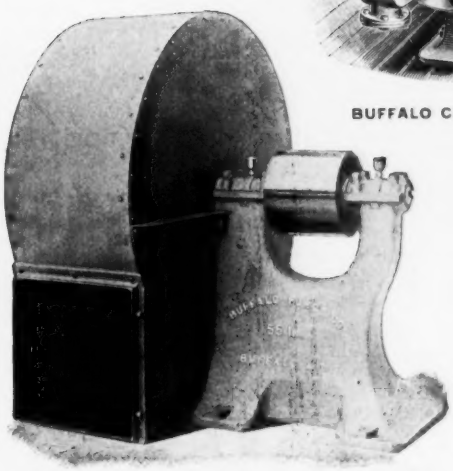


BUFFALO CLASS "A" AUTOMATIC ENGINE



BUFFALO TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Calalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

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BUFFALO, N. Y.

BUFFALO CUPOLA BLOWER.

# ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 24 |
| Addy & Co., Matthew | 30 |
| Albany Facing Mills Co. | 32 |
| American Glutrose Works | 22 |
| Barnett, Oscar, Estate of | 19 |
| Buckeye Light | 28 |
| Big Four R. R. | 31 |
| Brass Foundry Supply Co. | 31 |
| Brooklyn Fire Brick Works | 23 |
| Buffalo Forge Co. | 17 |
| Case Mnfg. Co. | 21 |
| Chicago Pneumatic Tool Co. | 6 |
| Clayton Air Compresser Co. | 25 |
| Clinton Iron & Steel Co. | 23 |
| Connersville Blower Co. | Back Cover |
| Cornell, J. B. & J. M. | 20 |
| Cowles Electric Smelting and Aluminum Co. | Inside Back Cover. |
| Dayton Coal & Iron Co. | 30 |
| Diamond Machine Co. | 26 |
| Dixon Crucible Co., Joseph | 4 |
| Domhoff & Joyce Co., The | 30 |
| Fox Machine Co | 18 |
| Garden City Sand Co. | 29 |
| Gobeille Pattern Co. | 26 |
| Goodrich & Co., F. A. | 30 |
| Gould & Eberhardt | 22 |
| Green, C. H. & Co. | 23 |
| Hanna & Co., M. A. | 30 |
| Heyl & Patterson | 27 |
| Hussman Crucible Co. | 22 |
| Irwin & Co., James | 21 |
| Keep, W. J. | 25 |
| Mack, Thomas | 30 |
| McCormick & Co., J. S. | 29 |
| McCullough-Dalzell Co. | 15 |
| Michigan Central R. R. | 24 |
| Miller, Wagoner, Fieser & Co. | 30 |
| Millet Core Oven Co. | 19 |
| Mohr, J. J. | 30 |
| Obermayer Co., The S. | Front Cover and page 1 |
| Paxson Co., J. W. | 2 and 3 |
| Pedrick & Ayer | 11 |
| Penn. R. R. | 28 |
| Phelps, H. D. | 18 |
| Pickands, Brown & Co. | 30 |
| Peirson & Co., C. L. | 30 |
| Pilling & Crane | 30 |
| Pridmore, Henry E. | 20 |
| Rand Drill Co. | 24 |
| Ridgway & Son, Craig | 8 |
| Rogers, Brown & Co. | 30 |
| Roots Company, P. H. & F. M. | Colored Insert, Bet. 8 and 9 |
| Sellers & Co., Wm. | 9 |
| Smith-Premier Typewriter Co. | 31 |
| Smooth On Mnfg. Co. | 25 |
| Stevenson, Field & Co. | 30 |
| Stewart, W. H. | 23 |
| Stover Manufacturing Co. | 27 |
| Stow Manufacturing Co. | 26 |
| Sturtevant Co., B. F. | 10 |
| Superior Charcoal Iron Co. | 22 |
| Tabor Mnfg. Co. | 26 |
| Ward & Nash | 24 |
| Washington Coal & Coke Co. | 7 |
| Wells Light Mnfg. Co. | 13 |
| Whitehead Bros. Co. | 5 |
| Whiting Foundry Equipment Co. | 16 |
| Wilbraham Baker Blower Co. | 12 |



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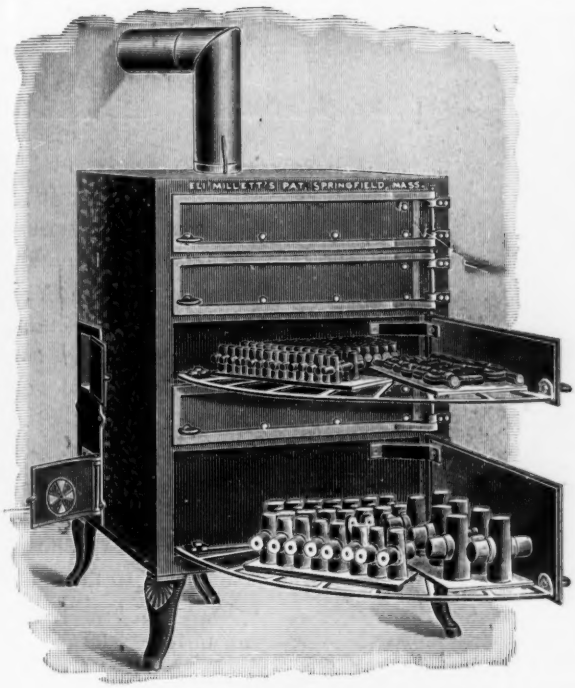


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**Double Doors,**
**One closing the oven when the other is open.**

**THE BEST IN THE WORLD.**

**No Foundry using small Cores can afford to be without it.**

**Over two hundred in use.**

*Send for our new Catalogue giving names of those using them.*

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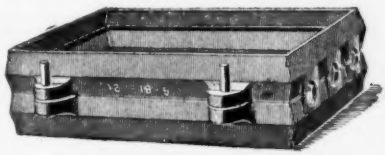

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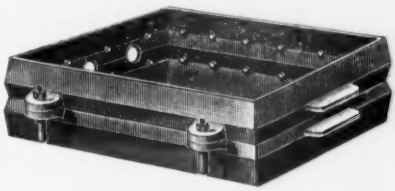
**State Size. Ask for Price.**

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



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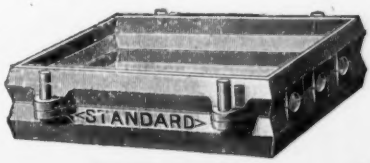
These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.

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(Standard Beveled Style.)
IT LEADS.
**NOT RIBBED.**
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STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.

Rights to use these machines for molding malleable iron or steel castings are reserved.

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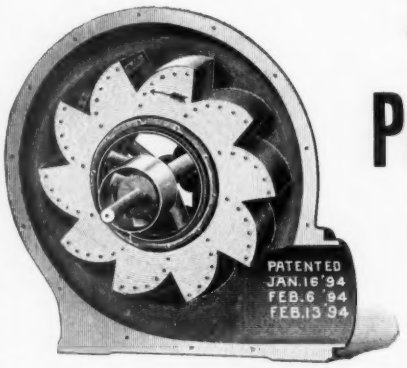
are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

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**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

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Hydrofluoric Acid is replacing Sulphuric Acid and the Tumbling Barrel with progressive foundrymen for cleaning castings. It DISSOLVES THE SAND instead of the iron, and is convenient to handle, being shipped in barrels, or in lead carboys.

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HIGH GRADE FLUOR SPAR FLUX
FOR IRON FOUNDRIES
AND BLAST FURNACES.

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A COMPREHENSIVE TREATISE ON

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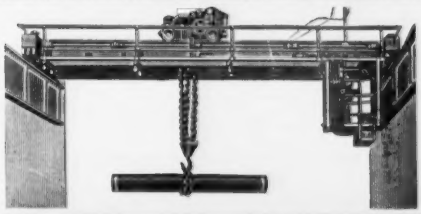

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THE CASE MFG CO
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In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

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These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

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## GLUTROSE

(Trade Mark.)

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It is cheaper and better than flour, rosin, oil, molasses or any other compound in use; takes the place of all other materials and never varies in quality.

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WHY PAY 30 to 40 CENTS FOR LINSEED OIL WHEN THE SAME RESULTS CAN BE OBTAINED FOR HALF THE MONEY?

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FOR MEN THAT

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using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

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PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

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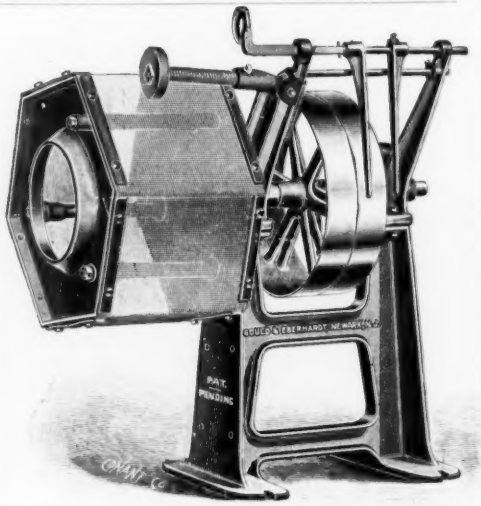


EBERHARDT'S IMPROVED AUTOMATIC SAND SIFTER.

*Messrs. Gould & Eberhardt, Newark, N. J.:*

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

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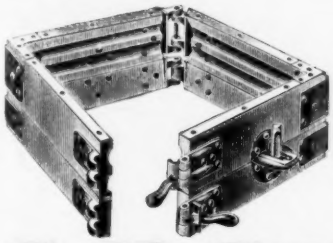

A Snap Flask that is always reliable. Heavily bound on both edges with band iron—strong, durable. We sell the "Eureka" cheaper than foundrymen can make **any** flask for, much less such a flask as this. Write for discounts.

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*"The Niagara Falls Route."*

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"As near perfection in the way of construction, appointments, service and able management as can be conceived in modern railroading.—*Extract from report of Railroad Commissioner, State of Michigan.*

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SIMPLE. DURABLE. ECONOMICAL.

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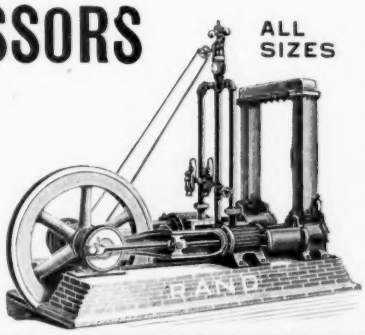


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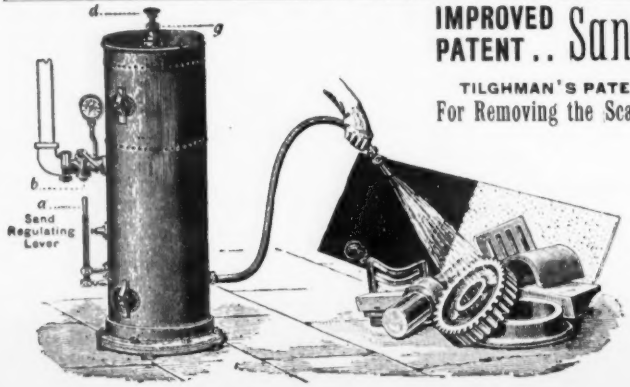


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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

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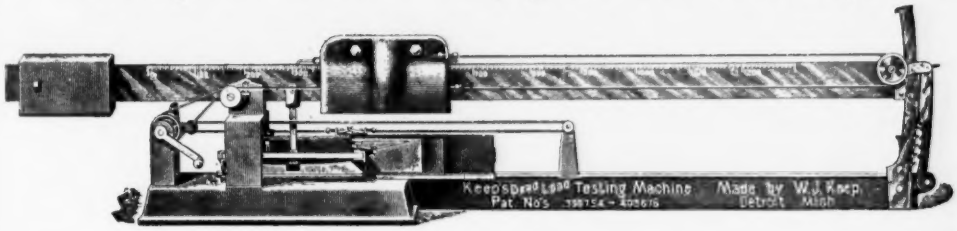


76 Yanners, Ramsbottom, Lancashire, Eng.
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DEAR SIR—I have for some time past been trying to keep my iron of one quality, but owing to the different qualities of scrap, I am unable to do so, and I am advised to use **"Keep's Test" Apparatus.** Please send description.

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Yours truly,

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FOUNDRY MOLDING MACHINES,
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**USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.**

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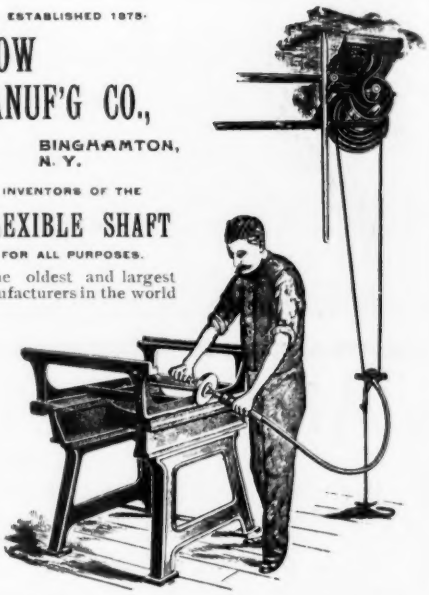

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Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

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(PROMPT AND RELIABLE)

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No. 7½ GRINDER.

***This Grinder***

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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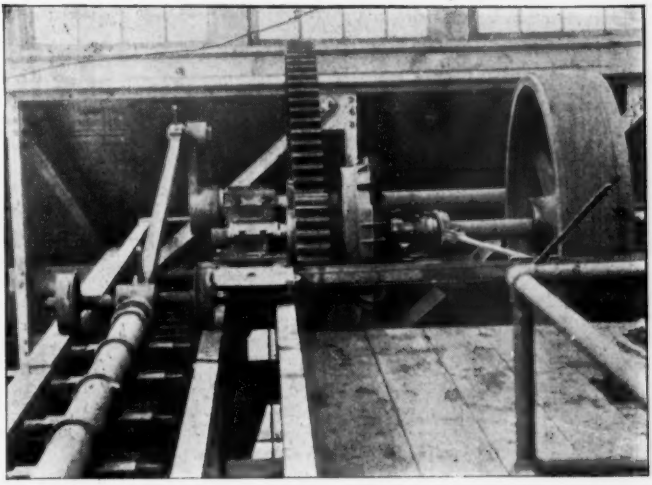

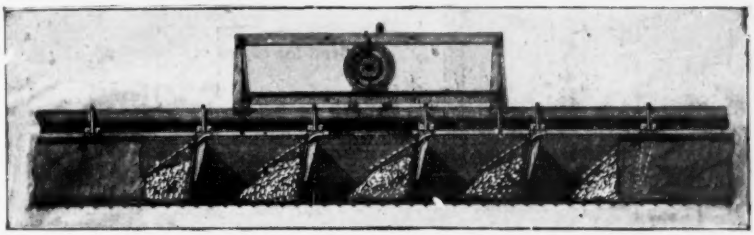

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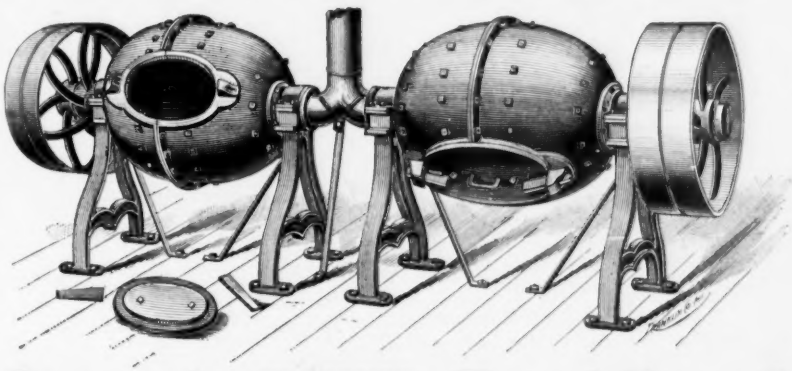

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The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

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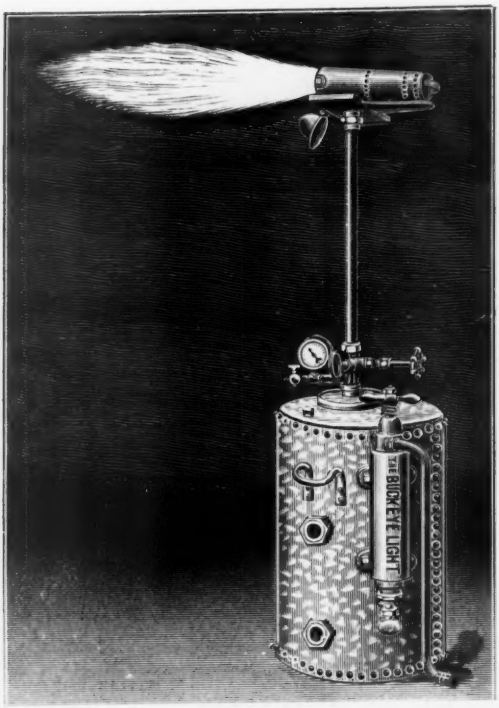


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## FOUNDRY LIGHTING

**The Only Light that will penetrate smoke and Steam.**

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**Flame can be adjusted Vertical or Horizontal.**

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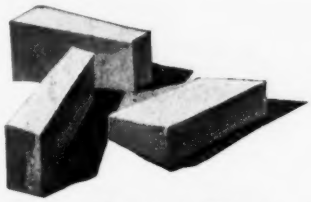
The greatest record ever made by any furnace in the South.



This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

**Garden City Sand Co.,** * * SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

# Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

## McCORMICK'S

## VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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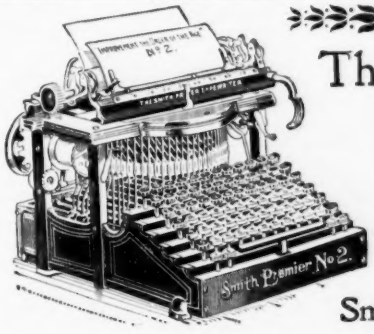


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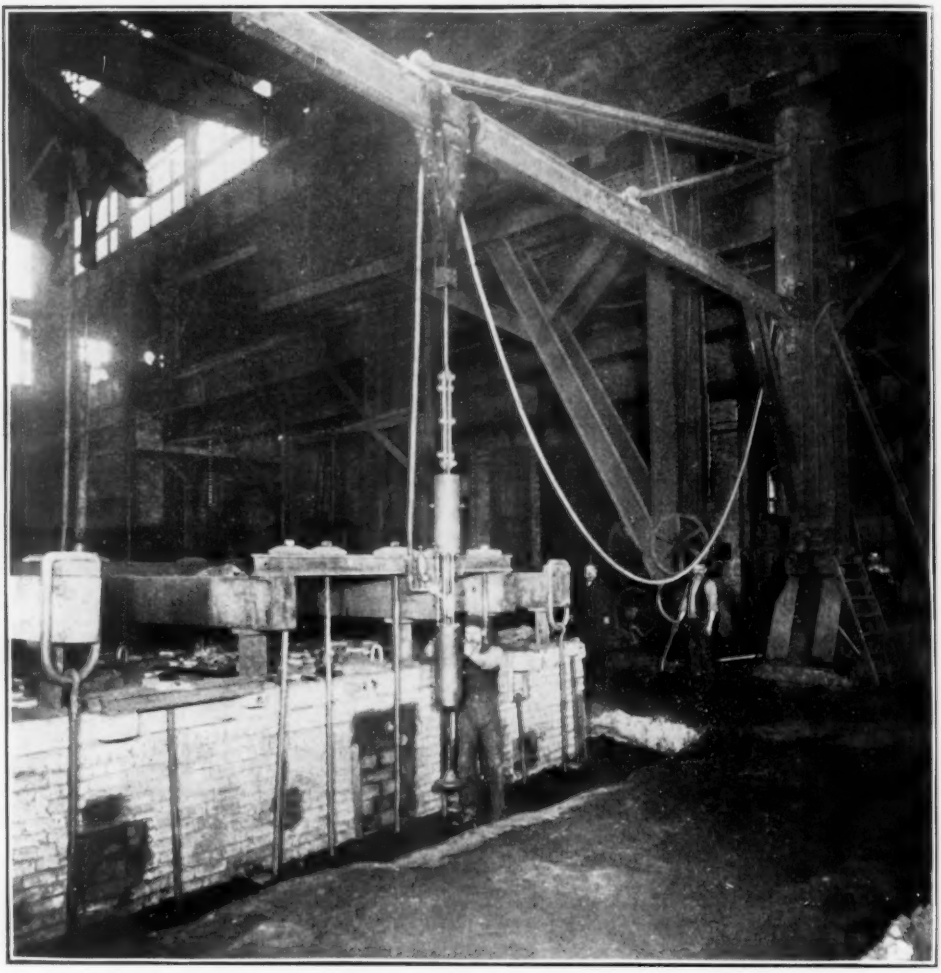

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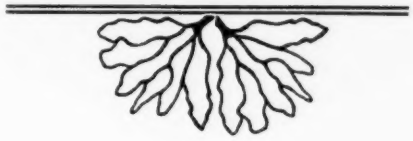

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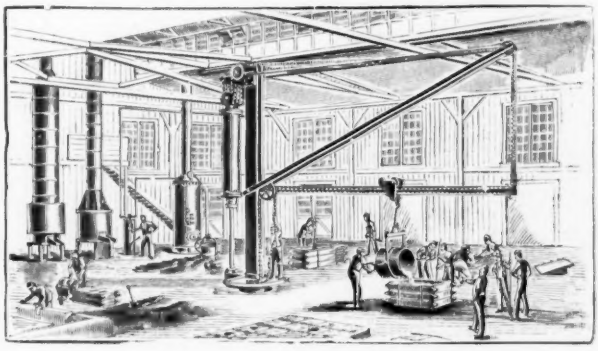
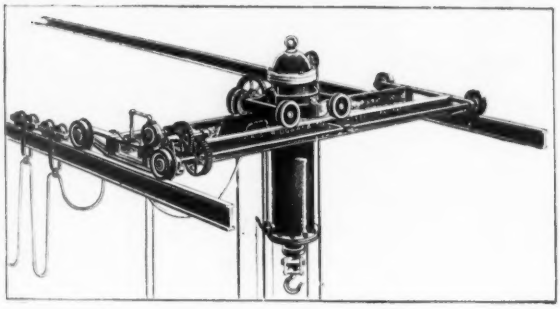
Well, some time ago this concern got one of our Steam Hydraulic Cranes for handling wire. Didn't have it in use such a great while until they sent for us to come and take the measurements for another, and now here they are again after some more—and we never asked them to buy Ridgway machines either!



5-Ton Steam Hydraulic Crane in a Foundry.

And this is the way it goes all the time. If we can get a concern to try our Steam-Hydraulic, or even go see some other fellow try it, we never have to bother about orders. The Ridgway Crane is its own best salesman. The truth is our Steam Hydraulic System (and by the way, this was originated by us and is covered by our patents) is the greatest godsend that ever come to a manufacturer having heavy stuff to handle. Just to think of it! without any cost for pumps, engines, dynamos, compressors or any other nonsense, we give you power cranes, elevators, pushers and other machines. Perfect hydraulic machines of high efficiency and all you need is a little piece of steam pipe to your boiler and a steam consumption so trifling that it is never considered. Investigate it.

# Hydraulic Air Hoists!



Sounds like a contradiction of terms, don't it? Yet that is about what it amounts to, only we use the air to push and the hydraulic to hold back. It's a mighty simple thing when you see it. Maybe the simplicity is the beauty of it. At any rate it makes the Air Hoist a perfect machine We are furnishing lots of them to wise people. You are most likely attracted by the cheap ordinary hoists—that's natural with some people—but if you will get **Just One** of these oil governed hoists and try it, you wouldn't have the other kind if you could get them for nothing. If you don't think our hoist is worth the money, send it back.

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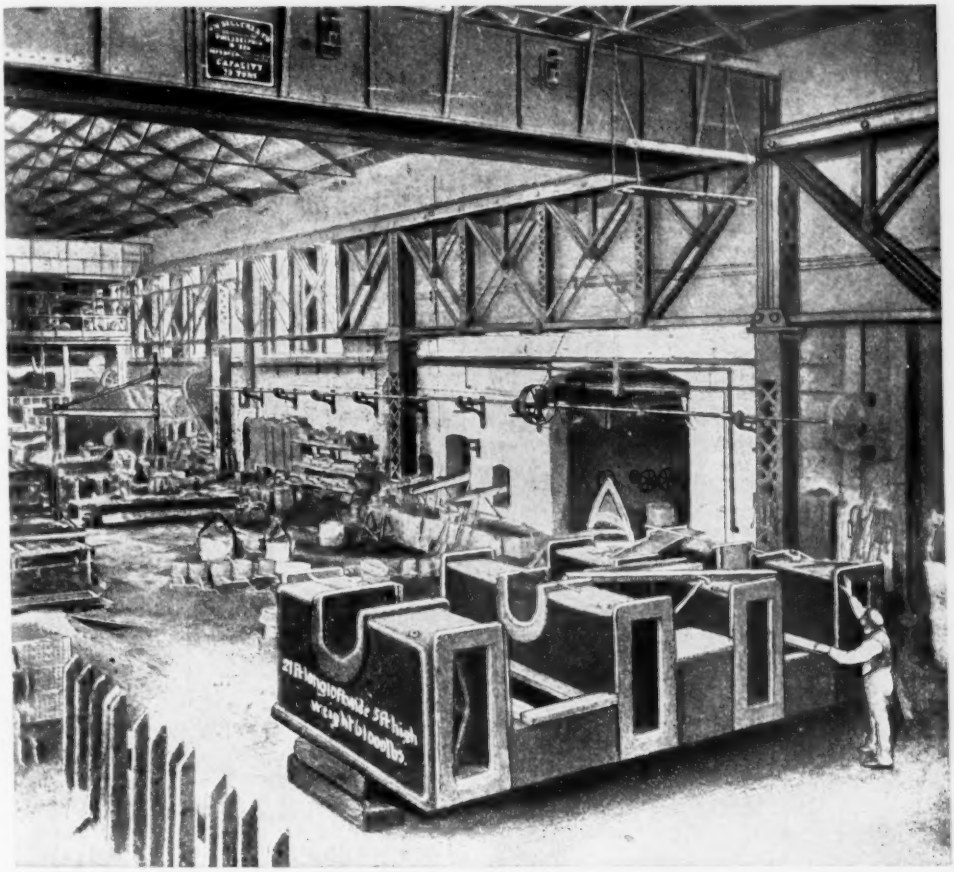
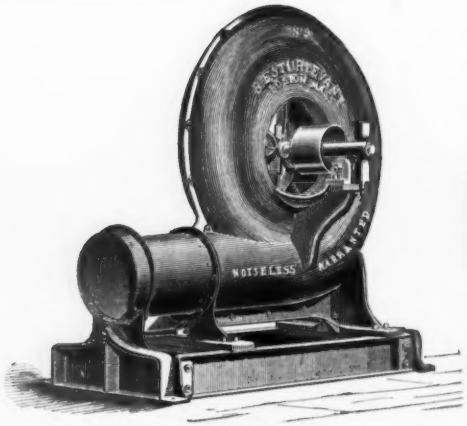


In former issues of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.

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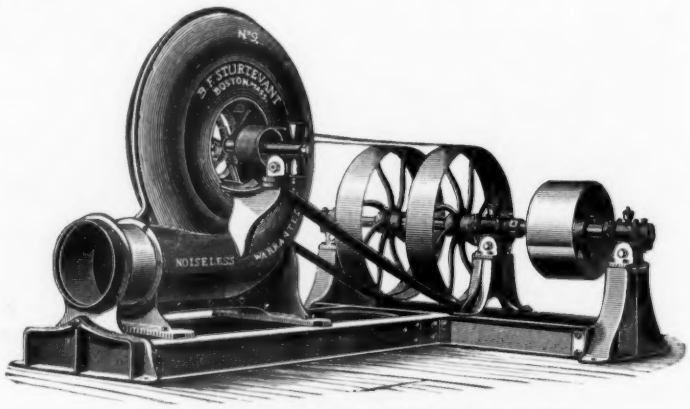
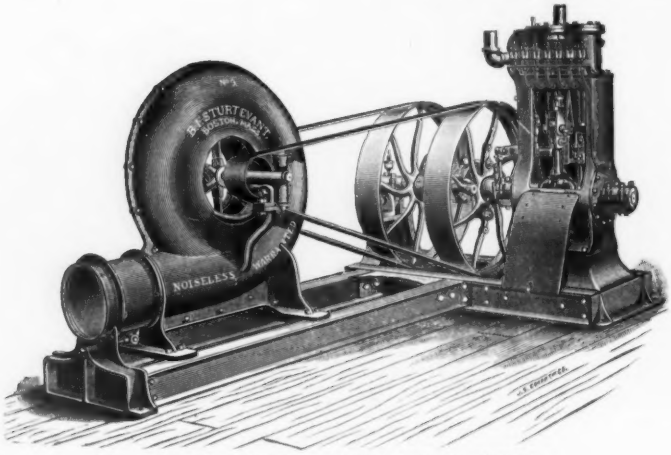



Blower on Adjustable Bed with Combined Countershaft.

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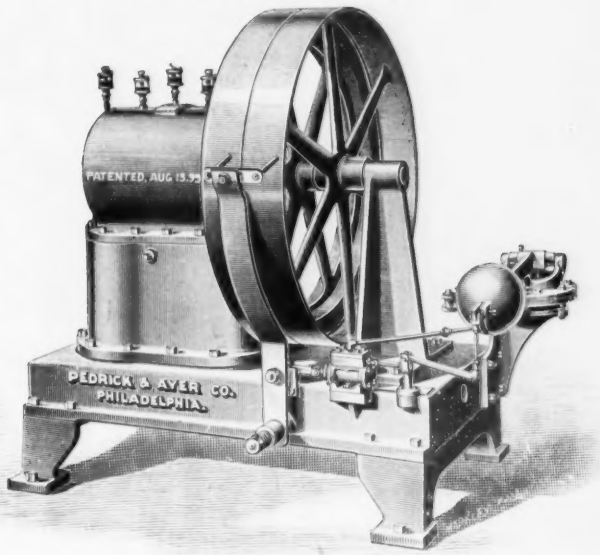


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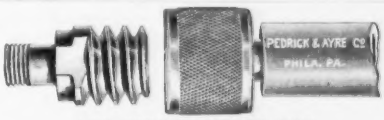


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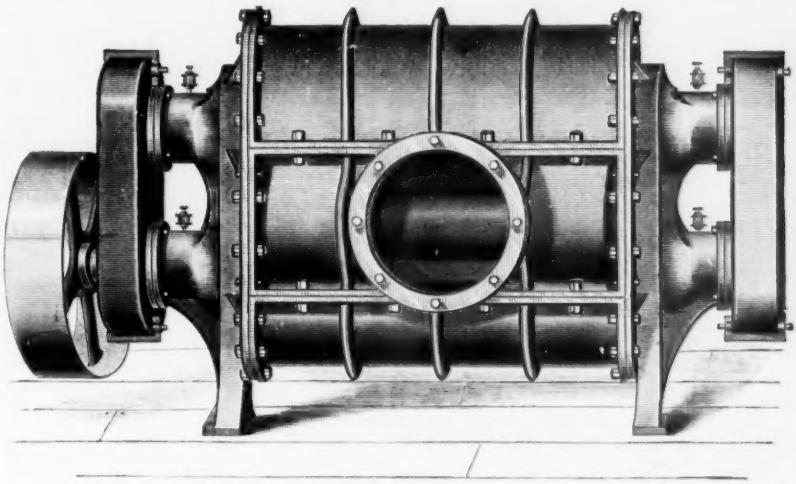

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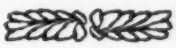

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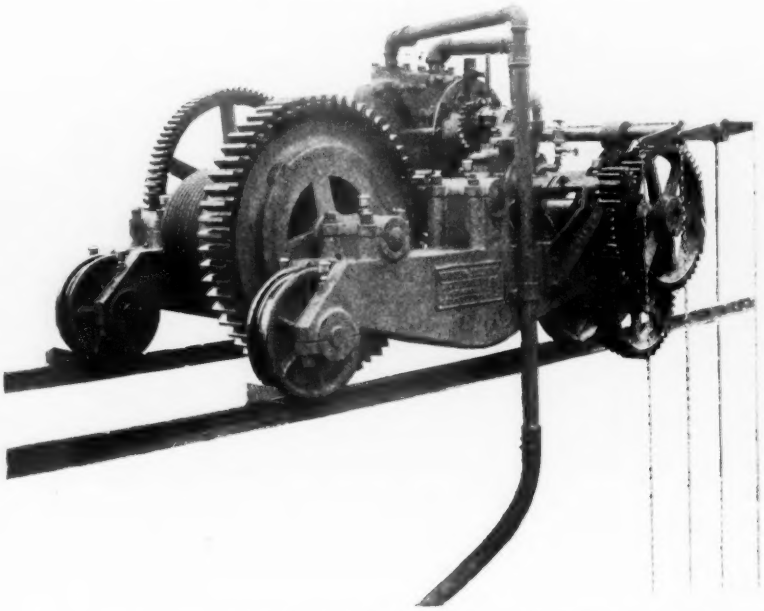

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# ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 24 |
| Addy & Co., Matthew | 30 |
| American Glutrose Works | 22 |
| Ayers, E. M. | 19 |
| Barnett, Estate of Oscar | 24 |
| Buckeye Light | 29 |
| Berlin Iron Bridge Co. | 25 |
| Brooklyn Fire Brick Works | 23 |
| Buffalo Forge Co. | 17 |
| Brass Foundry Supply Co. | 31 |
| Case Mnfg. Co. | 21 |
| Chicago Pneumatic Tool Co. | 6 |
| Clinton Iron & Steel Co. | 23 |
| Connersville Blower Co. ..... Back Cover | |
| Cornell, J. B. & J. M. | 18 |
| Cowles Electric Smelting and Aluminum Co. Inside Back Cover. | |
| Dayton Coal & Iron Co. | 30 |
| Diamond Machine Co. | 26 |
| Dixon Crucible Co., Joseph | 4 |
| Domhoff & Joyce Co., The | 30 |
| Garden City Sand Co. | 28 |
| Gobeille Pattern Co. | 26 |
| Goodrich & Co., F. A. | 30 |
| Gould & Eberhardt | 22 |
| Hanna & Co., M. A. | 30 |
| Hanson & Vanwinkle Co. | 31 |
| Heyl & Patterson | 27 |
| Holland Linseed Oil Co. | 32 |
| Hussman Crucible Co. | 22 |
| Irwin & Co., James | 21 |
| Keep, W. J. | 25 |
| Kelly & Co., T. P. | 20 |
| Mack, Thomas | 30 |
| McCormick & Co., J. S. | 28 |
| McCullough-Dalzell Co | 15 |
| Miller, Wagoner, Fieser & Co. | 30 |
| Millet Core Oven Co. | 19 |
| Mohr, J. J. | 30 |
| Obermayer Co., The S. Inside Front Cover and Page | 1 |
| Paxson Co., J. W. ..... 2 and | 3 |
| Pedrick & Ayer | 11 |
| Pickands, Brown & Co. | 30 |
| Pilling & Crane | 30 |
| Pridmore, Henry E. | 26 |
| Rand Drill Co. | 24 |
| Ridgway & Son, Craig | 8 |
| Rogers, Brown & Co. | 30 |
| Roots Company, P. H. & F. M. ..... Colored Insert | |
| Sellers & Co., Wm. | 9 |
| Smith-Premier Typewriter Co. | 31 |
| Smooth On Mnfg. Co. | 25 |
| Springfield Facing Co. | 31 |
| Springfield Foundry Co. | 21 |
| Standard Sand Co. | 25 |
| Stevenson, Field & Co. | 30 |
| Stewart, W. H. | 31 |
| Stover Manufacturing Co. | 27 |
| Stow Manufacturing Co. | 26 |
| Sturtevant Co., B. F. | 10 |
| Superior Charcoal Iron Co. | 12 |
| Tabor Mnfg. Co. | 26 |
| Taylor & Son, Robert J. | 12 |
| Ward & Nash | 24 |
| Washington Coal & Coke Co. | 7 |
| Wells Light Mnfg. Co. | 14 |
| Whitehead Bros. Co. | 5 |
| Whiting Foundry Equipment Co. | 16 |
| Wilbraham Baker Blower Co. | 13 |

## J. B. & J. M. CORNELL,

Manufacturers of POOLE'S PATENT

# Pressure Blowers and Exhausters

**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

**A COMPARATIVE TEST** between one of our Blowers (referred to as Blower "A") and one made by one of the best known makers in this country (referred to as Blower "B") was made by Prof. Denton, of Stevens Institute of Technology, Hoboken, N. J.

Prof. Denton says: "The general conclusions to be drawn from the experiments are: (1st) That for pressures varying from two to fourteen ozs. and quantities of air varying from 2,500 to 6,500 cubic feet per minute, Blower A delivered from 7 to 28 per cent. more air per horse power than Blower B. (2) That over the same range of pressures and volumes, Blower A utilizes in producing pressures from 6 to 60 per cent. more velocity of its blades than Blower B."

**OFFICE AND WORKS—26th St. and 11th Ave., NEW YORK CITY.**

WRITE FOR PRICES.

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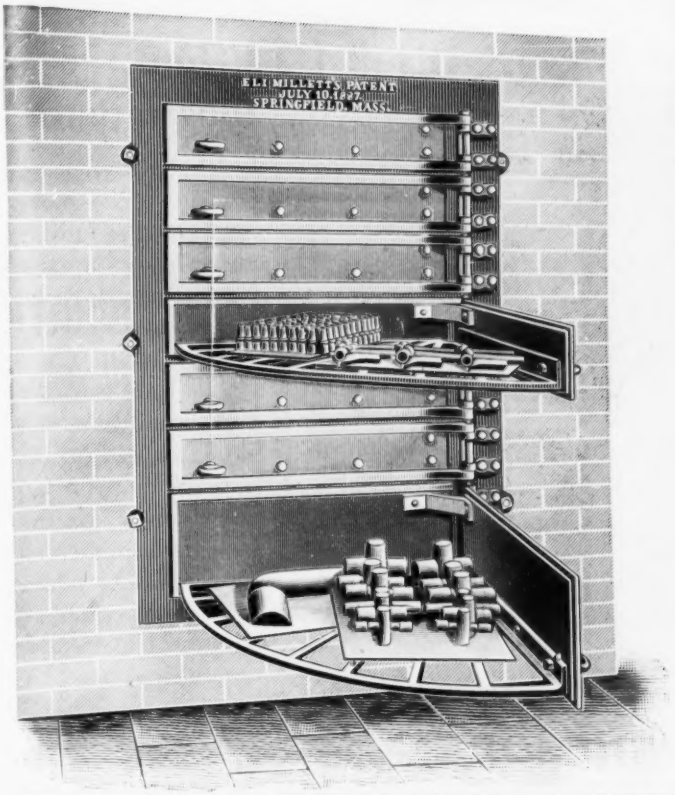



# Millett's Patent Core Oven

**Double Doors,**
One closing the oven when the other is open.

**THE BEST IN THE WORLD**

No Foundry using small cores can afford to be without it.

Over two hundred in use.

Send for our new Catalogue giving names of those using them.

**Millett Core Oven Co.**

BRIGHTWOOD, MASS.

*These Ovens can be seen in the show rooms of the S. OBERMAYER CO., Chicago or Cincinnati, or the J. W. PAXSON CO., Philadelphia, Pa.*

# When People

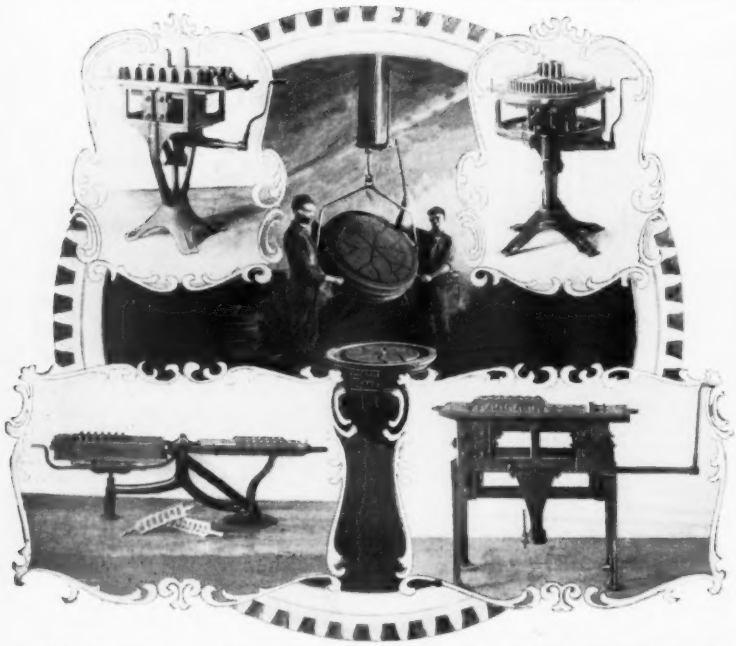
handle anything as a side line, it is liable to be neglected and attended to only when there is nothing else to claim attention.

This is as much true of molding sand as anything else. Carelessness in selection and mining will cause the foundryman untold annoyance later on.

We put our whole time into the mining and shipping of molding sand. We are specialists in our line and you know the specialist is the man who gives satisfaction both in price and quality.

**E. M. AYERS,** ZANESVILLE, O.

WESTERN AGENT—
H. S. VROOMAN, 220 W. 20th St., CHICAGO.



Rights to use these machines for molding malleable iron or steel castings are reserved.

## In this Illustration

are shown a few examples of special molding machines built for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

## Which do you wear most

your thinking cap or your working cap? The foundryman who studies to save himself labor and expense, who strives to have his castings make the best possible appearance, finds nothing so helpful as

## Kelly's Plumbago

It does the work on all grades of castings and a dollar's worth of it goes further than a dollar's worth of any other man's plumbago.

Samples, if you write for them.

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FOR IRON FOUNDRIES
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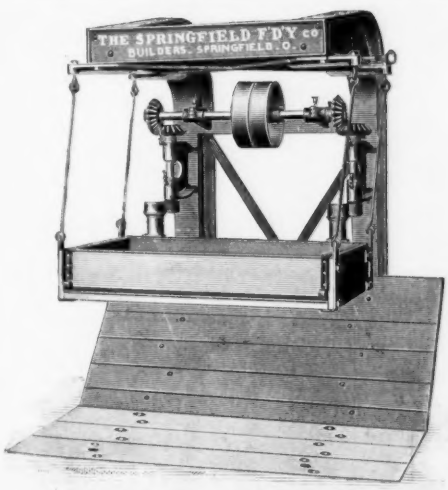


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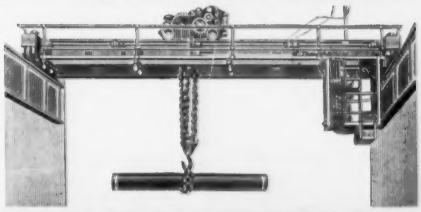

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FOR MEN THAT

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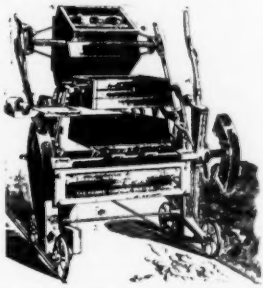

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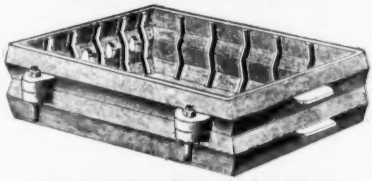

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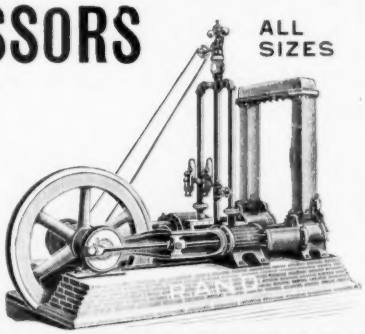


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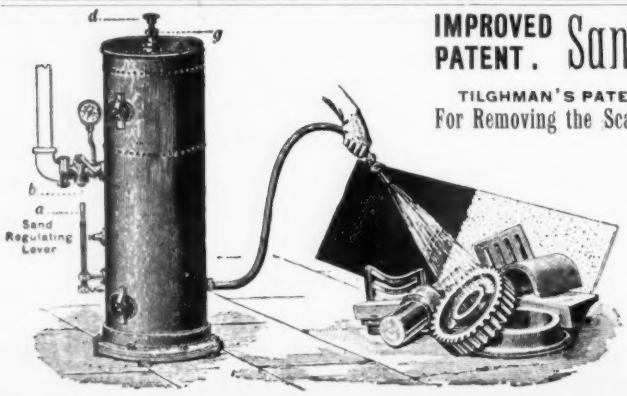


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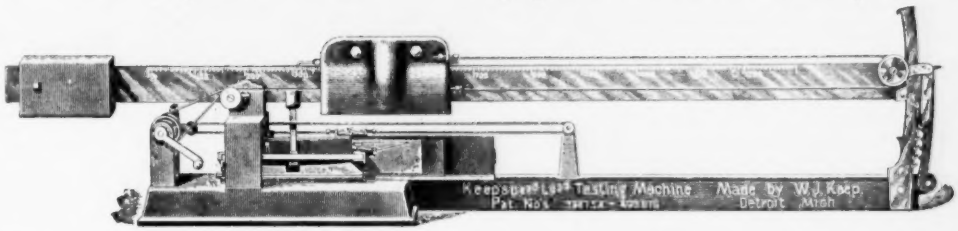


76 Yanners, Ramsbottom, Lancashire, Eng.
August 30, 1898.

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Yours respectfully, JOHN CALLISTER.

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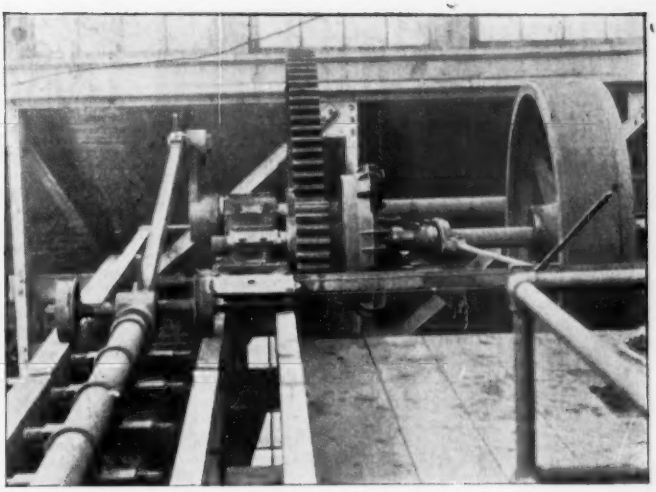

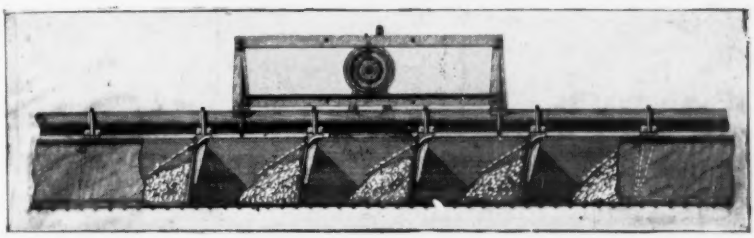

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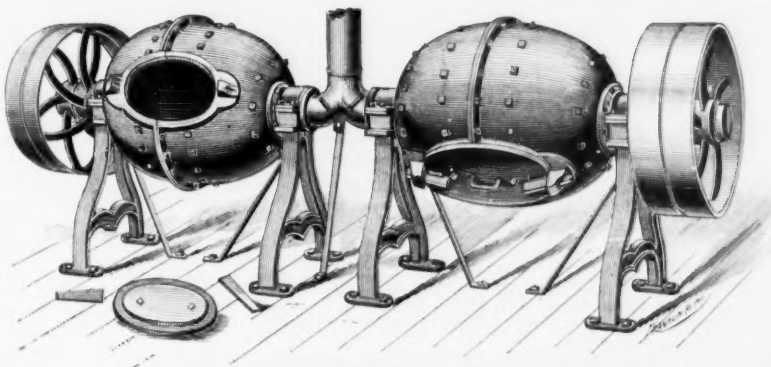

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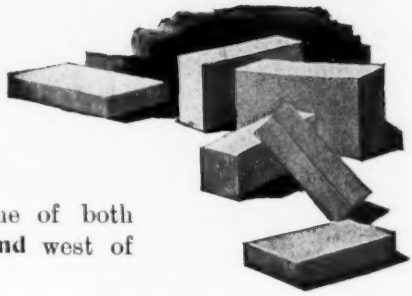

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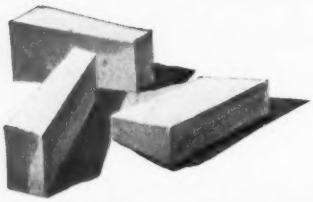

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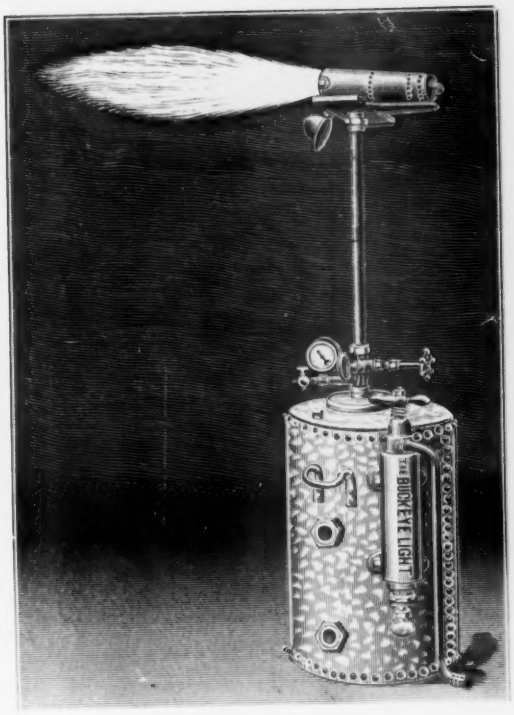


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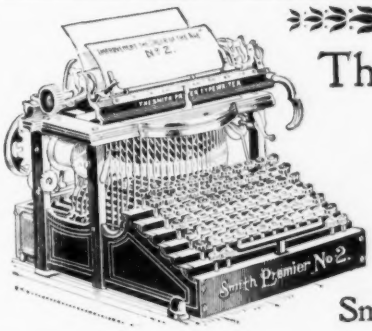


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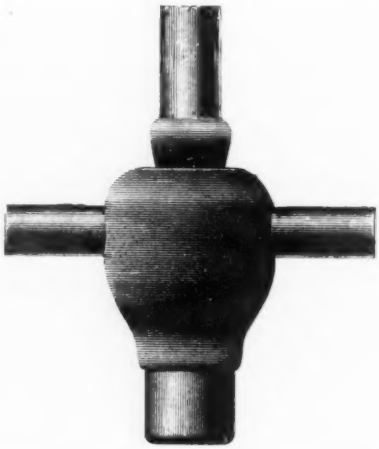
# LIQUID CORE COMPOUND

Used by many of the largest and well-known Iron and Brass Foundries in the United States, Canada, Great Britain and Germany. It is the standard article for making cores.

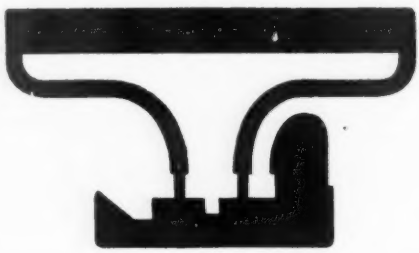
Send for Decriptive Circular.

**W. H. STEWART,** 105 JOHN STREET, **NEW YORK.**

# Ten Years Ago ..



Here are some of the Cores we make without Vents do not need them . . . . . .



it would be very hard to find a foundryman who used anything but flour — good XXX flour, mind you—with which to make cores. Some of them wanted beer also, and there is a wide spread suspicion that all the beer bought did not get into the cores, either.

# Nowadays ..

it is different, and it is even harder to find an up-to-date, first-class foundryman who uses flour than it was before to find one who would do without it.

**Here is one of the reasons for the . . change . . . . . .**

## A Dollar's worth of our Oil Compound will make more Cores than a Dollar's worth of Flour and the Cores will never blow.

**Compared with Flour, our Compound costs nothing, as it more than saves its entire cost . . . . . .**

SEND FOR SAMPLE

## Holland Linseed Oil Co

683 Austin Avenue, CHICAGO

# BUY THE ORIGINAL AND BEST

We make the STANDARD facings and Blackings known the world over. ALL CRUDE MATERIALS ARE ANALYZED and thoroughly tested ere they enter the manufacture, so you will always get "value received" from us.

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THE LARGEST AND MOST RELIABLE FOUNDRY SUPPLY HOUSE IN THE WORLD.

We have everything you need in your foundry—

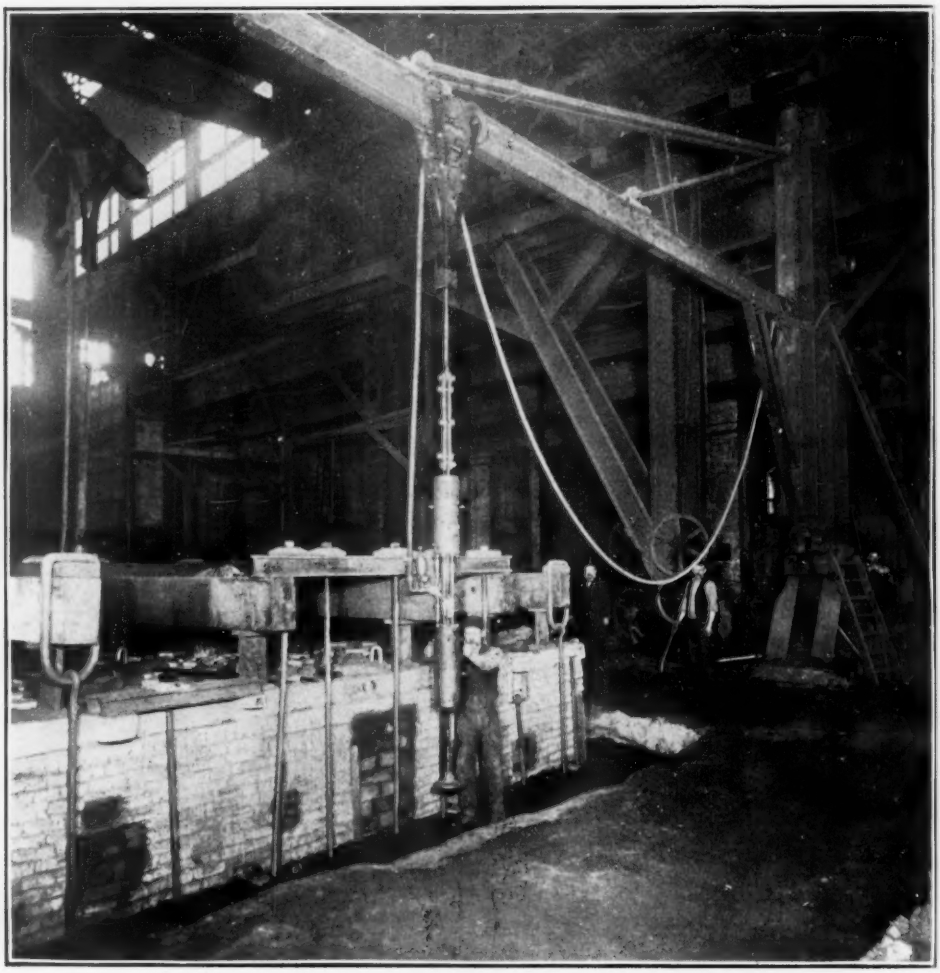
FACINGS, BLACKINGS, CORE WASH, BRASS SAND, CRUCIBLES, PLUMBAGO, SILVER LEAD, TALC, FIRE BRICK, MOULDING SANDS, ETC.

Also—

CUPOLAS, LADLES, CRANES, TUMBLING MILLS, MOULDING MACHINES, IRON FILLER, SHOVELS, RIDDLES, BRUSHES, BELLOWS, ETC.

Have you Catalogue No. 26? If not, write for same and mention "THE FOUNDRY."

# Cramp Pneumatic Rammer



Invented to save labor in ramming up a mold.

Swung upon a light crane attached to the side of the building or from a post.

A trolley gives it two motions, in-and-out and circular, covering every inch of surface in a radius of 25 or 30 feet.

Can be run by air or steam, compressed air preferable. With a pressure of about forty pounds it strikes 250 times a minute or as desired.

One man handles it with ease and does the work of a dozen by hand ramming.

The sand or dirt is packed with an even pressure.

The mold is secured beyond a doubt and saves metal by uniform ramming.

The mold is rammed up in one-third the time.

No well equipped Foundry can afford to be without this machine.

For further particulars, apply to

**J. W. Paxson Co.**

1021 North Delaware Avenue,
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# A NEW IDEA!

**Foundrymen! Control the Gear Business in Your Own Locality!**

The day of costly patterns, destructive rapping, and teeth-with-draft is passing; the machine molded gear, made without pattern, and with draftless teeth is here to stay. Why let outsiders ship fine machine molded gears to your next door neighbor, **and catch other work?**

UNIVERSAL GEAR MOLDING MACHINE. (GROVES' PATENT.)

The machine illustrated above is described as Universal, because it is perfectly adapted for the molding of Spur, Bevel, Helical Staggered or Worm Toothed Gearing (internal or external) from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts, except tooth block.

# Groves' Portable Gear Molding Machine

**No Jobbing Foundry can afford to be without it. Others use it, why not you?**

This simple, economical and inexpensive appliance is adapted for molding the teeth of large gears from 32 inches up to 24 feet in diameter and any face; also rims of Belt and Rope-Driving Pulleys, Band and Fly Wheels, etc., doing away with large, expensive full patters and can be removed from the foundry floor in a few minutes after the mold is formed, thus leaving valuable space ready for other work.

**Apply for Price, etc., to the . . Exclusive Agents . . . . . J. W. PAXSON CO. 1021 N. Deleware Avenue, PHILADELPHIA, PA.**

# 50 Years Ago!

**50 years ago Joseph Dixon received the above medal for Crucibles of an Excellent Quality.**

THAT wasn't the first nor the last medal received, as the **Dixon Crucibles** have won medals and testimonials from all parts of the world, during the seventy years they have been made.

**Seventy years of experience** and the best equipped factory in the world explain the reason why we are able to make the best black lead crucibles in the world.

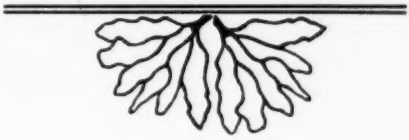
## Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

# Whitehead Brothers Company,

DEALERS IN

# Molding Sand



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FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
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OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Castings.**

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# We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

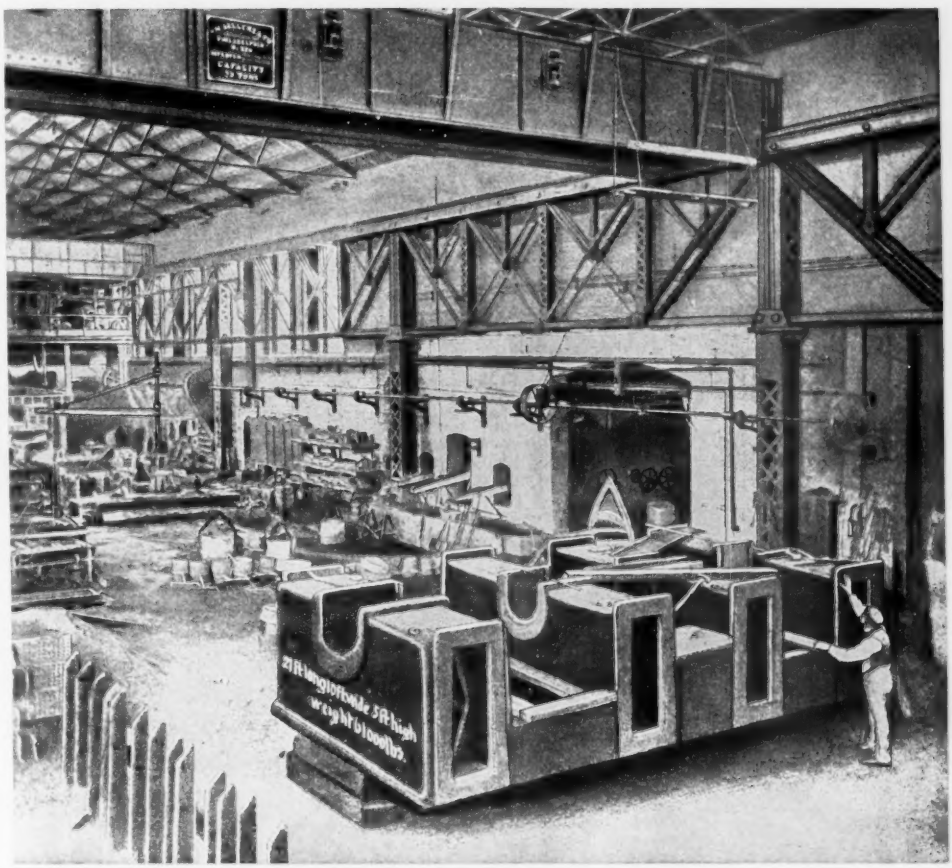
## Chicago Pneumatic Tool Co.,

**635 Monadnock Building, CHICAGO, ILL.**

# William Sellers & Co., Incorp.

**PHILADELPHIA.**

# MODERN FOUNDRY MACHINERY

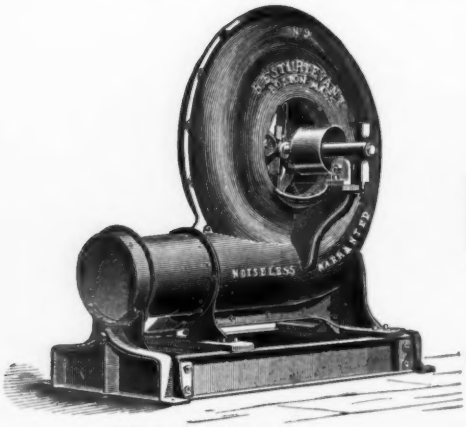


In former issues of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.




Blower on Adjustable Bed.

# THE STURTEVANT STEEL Pressure Blowers,

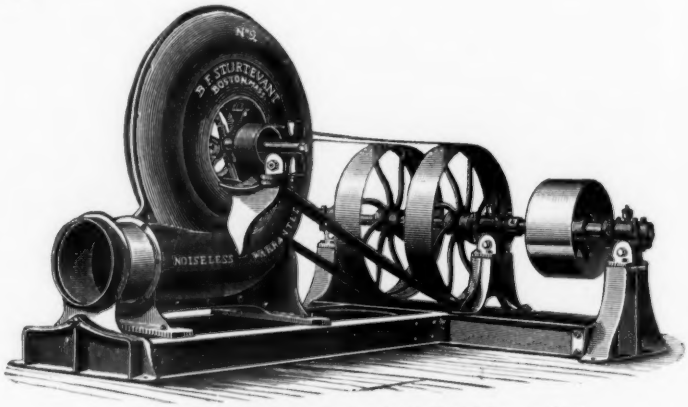
—FOR—

Cupola Furnaces and Forge Fires.

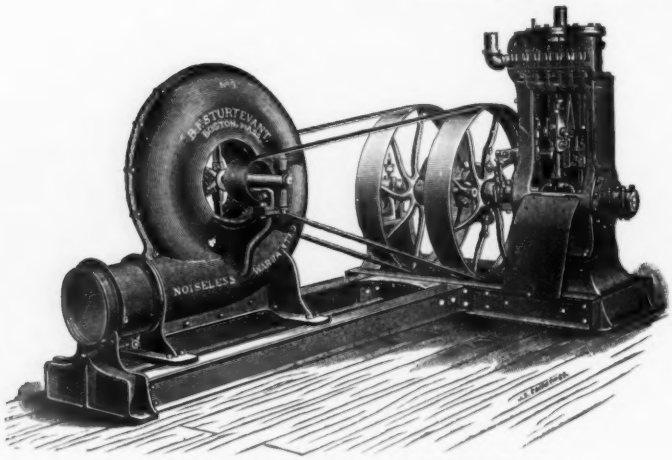
## BLOWERS

Furnished without Bed with Separate Countershaft

## BLAST GATES




Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

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WITH

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Direct Connected

## Electric Motors

Send for Catalogue.

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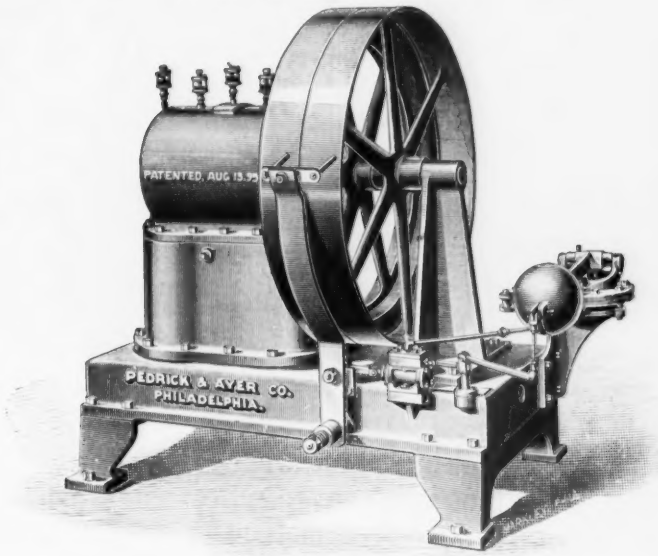
STOCK CARRIED AT BRANCHES.

# Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.




**Straight Lift Hoist.** **Built in two sizes, Nos. 1 and 2.**

| No. | Size of Cylinders in inches | Revolutions per Minute. | Cubic Feet of Free Air | Horse Power Required. | Size of Pulleys in inches | Shipping Weight of Compressor | Floor Space in inches | Telegraphic Symbol |
|---|---|---|---|---|---|---|---|---|
| 1 | 11x 6 6x 6 | 100-160 | 32- 50 | 2-3½ | 40x5 | 2875 lbs. | 60x40 | Parian |
| 2 | 15x10 8x10 | 90-120 | 90-120 | 9-15 | 60x6 | 5370 lbs. | 76x60 | Parish |

**HORIZONTAL HOIST.**

PAT. SEPT. 4TH 1894.

**AIR HOSE COUPLING**

**For ⅛ inch, ¼ inch and 1 inch Hose.**

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

**Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.**

# PEDRICK & AYER CO.

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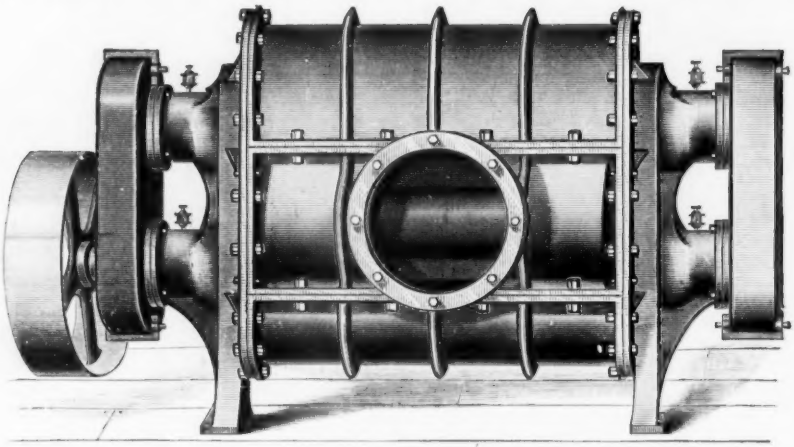
# The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

## High Pressure Blowers

GAS EXHAUSTERS

## Exhausters for Hot Gases

**The GREEN Gives the Most Value for a $.**

# Wilbraham Baker Blower Co

**2518 Frankford Ave. PHILADELPHIA, PA.**

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES

Over 12,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

# FOUNDRIES

**PORTABLE, SELF-CONTAINED, AUTOMATIC.**

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

## Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

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## THE WELLS LIGHT M'F'G. CO.,

**EDWARD ROBINSON, Sole Proprietor.**

44-46 WASHINGTON STREET, NEW YORK.

ROSS MEEHAN FOUNDRY CO.,
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*The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:*

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
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CRUCIBLES for Brass Melting .

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ALL ARTICLES CONTAINING PLUMBAGO

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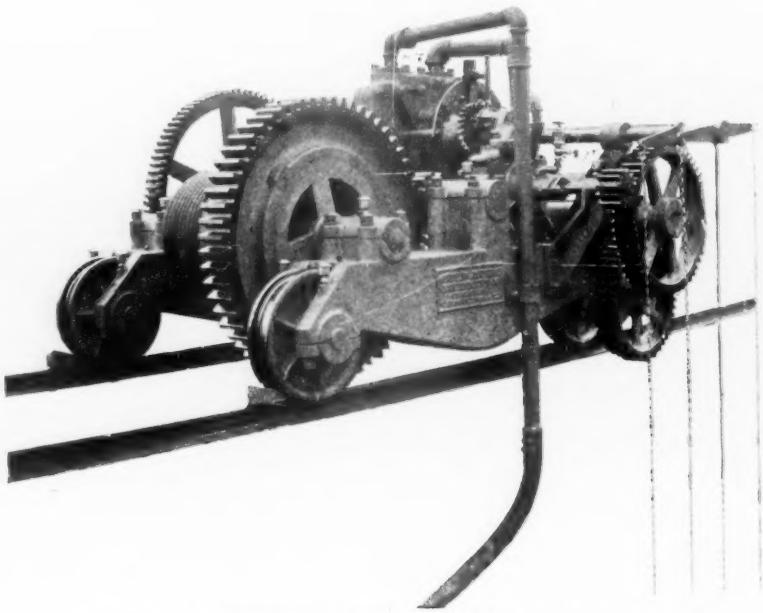

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Electric and Hand Power Travelers,

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CUPOLAS LADLES, TUMBLERS AND . . ALL FOUNDRY EQUIPMENTS.

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GENERAL OFFICE AND WORKS; HARVEY, ILL., (CHICAGO SUBURB.)

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A BUFFALO BLOWER—Enough Said.

# ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 24 |
| Addy & Co., Matthew | 14 |
| American Glutrose Works | 22 |
| Barnett, Estate of Oscar | 19 |
| Buckeye Light | 28 |
| Berlin Iron Bridge Co. | 25 |
| Big Four R. R. | 31 |
| Brooklyn Fire Brick Works | 23 |
| Buffalo Forge Co. | 17 |
| Brass Foundry Supply Co. | 30 |
| Case Mnfg. Co. | 21 |
| Chicago Pneumatic Tool Co. | 6 |
| Clinton Iron & Steel Co. | 23 |
| Connersville Blower Co. | Back Cover |
| Cornell, J. B. & J. M. | 31 |
| Cowles Electric Smelting and Aluminum Co. | Inside Back Cover. |
| Dayton Coal & Iron Co. | 14 |
| Diamond Machine Co. | 26 |
| Dixon Crucible Co., Joseph | 4 |
| Domhoff & Joyce Co., The | 14 |
| Fox Machine Co. | 30 |
| Garden City Sand Co. | 29 |
| Gobeille Pattern Co. | 26 |
| Goodrich & Co., F. A. | 14 |
| Gould & Eberhardt | 22 |
| Green, C. H. & Co. | 23 |
| Hanna & Co., M. A. | 14 |
| Hanson & Vanwinkle Co. | 30 |
| Heyl & Patterson | 27 |
| Holland Linseed Oil Co. | 32 |
| Hussman Crucible Co. | 22 |
| Irwin & Co., James | 21 |
| Keep, W. J. | 25 |
| Kelly & Co., T. P. | 20 |
| Mack, Thomas | 4 |
| McCormick & Co., J. S. | 32 |
| McCullough-Dalzell Co. | 15 |
| Michigan Central R. R. | 34 |
| Miller, Wagoner, Fieser & Co. | 14 |
| Millet Core Oven Co. | 16 |
| Mohr, J. | 4 |
| Obermayer Co., The S. | Front Cover and page 1 |
| Paxson Co., J. W. | 2 and 3 |
| Pedrick & Ayer | 11 |
| Penn. R. R. | 28 |
| Phelps, H. D. | 18 |
| Pickans, Brown & Co. | 14 |
| Pilling & Crane | 14 |
| Pridmore, Henry E. | 20 |
| Rand Drill Co. | 24 |
| Ridgway & Son, Craig | 8 |
| Rogers, Brown & Co. | 14 |
| Roots Company, P. H. & F. M. | Colored Insert, Bet. 8 and 9 |
| Sellers & Co., Wm. | 9 |
| Smith-Premier Typewriter Co. | 31 |
| Smooth On Mnfg. Co. | 25 |
| Standard Sand Co. | 33 |
| Stevenson, Field & Co. | 14 |
| Stewart, W. H. | 33 |
| Stover Manufacturing Co. | 27 |
| Stow Manufacturing Co. | 26 |
| Sturtevant Co., B. F. | 10 |
| Superior Charcoal Iron Co. | 22 |
| Tabor Mnfg. Co. | 26 |
| Ward & Nash | 24 |
| Washington Coal & Coke Co. | 7 |
| Wells Light Mnfg. Co. | 13 |
| Whitehead Bros. Co. | 5 |
| Whiting Foundry Equipment Co. | 16 |
| Wilbraham Baker Blower Co. | 12 |



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I make both, but am particularly successful in making bronze castings for pattern work.

One foundryman said lately that my pattern castings were good enough almost to gate up and use without any filing.

I can make almost any kind of brass work and in ornamental work—either patterns or quantity—I am in the King row. I can also furnish finished patterns in brass or wood. I also do drilling, tapping and galvanizing.

**Correspondence Solicited on any of these matters.**

**H. D. PHELPS, ANSONIA, CONN.**

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**If You Want**

## Foundrymen

**to Read Your "AD"**

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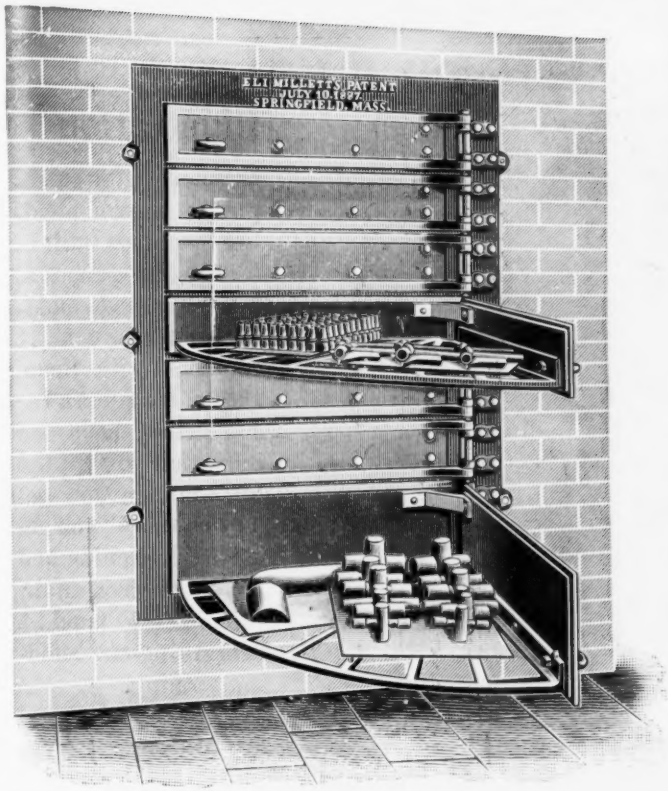


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**Double Doors,**
One closing the oven when the other is open.

**THE BEST IN THE WORLD**

No Foundry using small cores can afford to be without it.

Over two hundred in use.

Send for our new Catalogue giving names of those using them.

## Millett Core Oven Co.

BRIGHTWOOD, MASS.

*These Ovens can be seen in the show rooms of the S. OBERMAYER CO., Chicago or Cincinnati, or the J. W. PAXSON CO., Philadelphia, Pa.*

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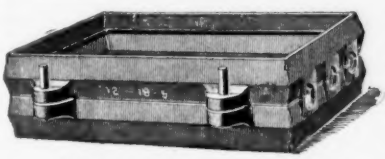
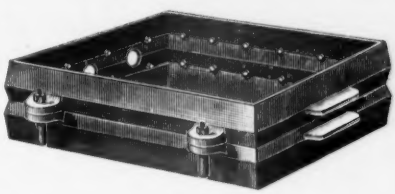


HORIZONTAL LIGHT RIBBED.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



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(PAT. APPLIED FOR.) Made in 1808.

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ESTABLISHED 1845.

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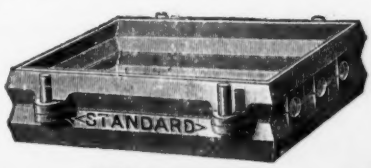
These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.

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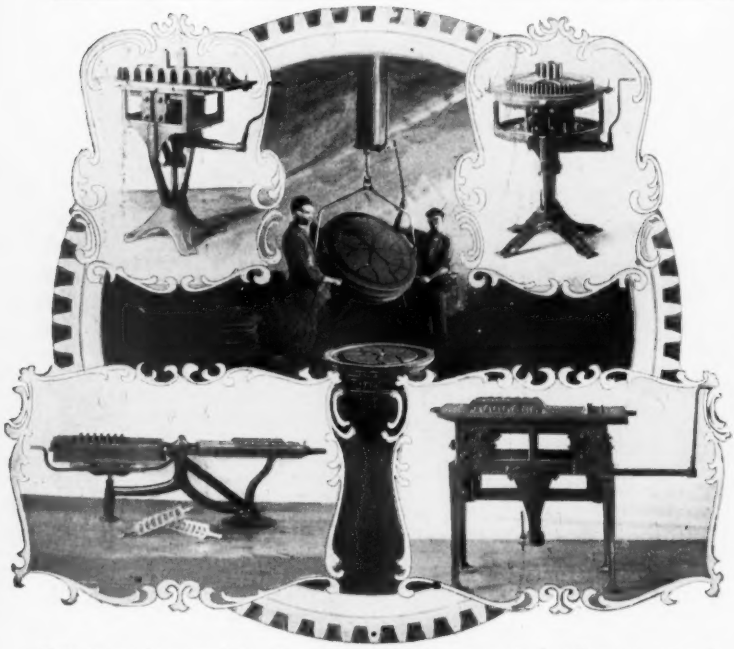
PERPENDICULAR RIBBED.
DEMEREST'S PATENT, 1855.

**OSCAR BARNETT'S OLD RELIABLE**
(Standard Beveled Style.)
IT LEADS.
**NOT RIBBED.**
Our own foundry insures prompt shipment. Faces planed level; don't rock.

STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.



Rights to use these machines for molding malleable iron or steel castings are reserved.

## In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

## Which do you wear most

your thinking cap or your working cap? The foundryman who studies to save himself labor and expense, who strives to have his castings make the best possible appearance, finds nothing so helpful as

# Kelly's Plumbago

It does the work on all grades of castings and a dollar's worth of it goes further than a dollar's worth of any other man's plumbago.

Samples, if you write for them.

**T. P. Kelly & Company,** MILLS AT . . Reissing, Pa. Bloomsbury, N. J.

WESTERN OFFICE and MILLS: 544-546 W. 22nd St., NEW YORK, N. Y.
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# JAMES IRWIN & CO

**MANUFACTURING CHEMISTS,**

343 Sixth Avenue, PITTSBURGH, PA.

## SULPHURIC ACID
## HYDROFLUORIC ACID

**FOR CLEANING CASTINGS.**

Hydrofluoric Acid is replacing Sulphuric Acid and the Tumbling Barrel with progressive foundrymen for cleaning castings. It DISSOLVES THE SAND instead of the iron, and is convenient to handle, being shipped in barrels, or in lead carboys.

SOLE AGENTS FOR

## Kentucky Fluor Spar Co.'s

**HIGH GRADE FLUOR SPAR FLUX FOR IRON FOUNDRIES AND BLAST FURNACES.**

THE

# IRON-FOUNDER.

A COMPREHENSIVE TREATISE ON

## THE ART OF MOLDING

INCLUDING CHAPTERS ON

CORE-MAKING, LOAM, DRY-SAND, AND GREEN-SAND MOLDING, ALSO CRYSTALLIZATION, SHRINKAGE, AND CONTRACTION OF CAST-IRON, AND A FULL EXPLANATION OF THE SCIENCE OF PRESSURES IN MOLDS; ADDED TO WHICH ARE FORMULAS FOR MIXTURES OF IRON, TABLES, RULES, AND MISCELLANEOUS INFORMATION.

**BY SIMPSON BOLLAND,**

Practical Molder and Manager of Foundries.

382 Pages—Illustrated with over Three Hundred Engravings.

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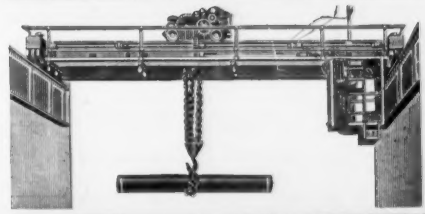

## ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO

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# YOUR IRON CONTRACTS

In making your contracts for 1899 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

**"PIONEER,"**
**"ANTRIM,"**
**"ELK RAPIDS."**

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

## Superior Charcoal Iron Co

911, 912, 913 Michigan Trust Bldg.,
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# CORE COMPOUND

# GLUTROSE

(Trade Mark.)

## The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience, It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil, molasses or any other compound in use; takes the place of all other materials and never varies in quality.

WILL MAKE FIRST-CLASS RADIATOR CORES WITHOUT RODDING.

WHY PAY 30 to 40 CENTS FOR LINSEED OIL WHEN THE SAME RESULTS CAN BE OBTAINED FOR HALF THE MONEY?

**WILL NEVER BLOW THE CASTINGS.**

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Sole Manufacturers.
OFFICE: PENN MUTUAL BUILDING,
No. 925 Chestnut St., Philadelphia.

WE MANUFACTURE

# PLUMBAGO CRUCIBLES

FOR MEN THAT

**UNDERSTAND**

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

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PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

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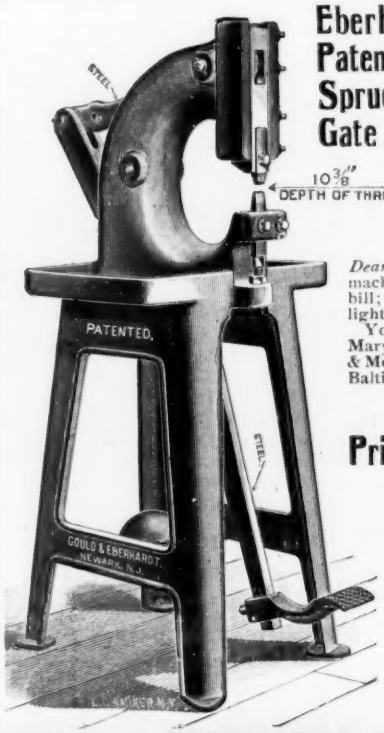


*Dear Sir*:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
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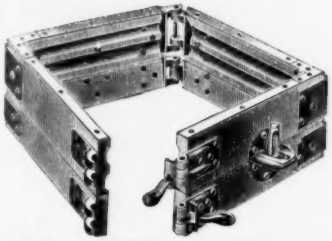
**Price Low**

Send to

## GOULD & EBERHARDT, NEWARK, N. J.

# EUREKA Improved SNAP FLASK.



A Snap Flask that is always reliable. Heavily bound on both edges with band iron—strong, durable. We sell the "Eureka" cheaper than foundrymen can make **any** flask for, much less such a flask as this. Write for discounts.

No. 1—Hardwood, 1¼ inch stock, each $2.75.
No. 2—Whitewood, 1¼ " " " $2.50.

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## LIQUID CORE COMPOUND

Used by many of the largest and well-known Iron and Brass Foundries in the United States, Canada, Great Britain and Germany. It is the standard article for making cores.

Send for Decriptive Circular.

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"FAIR DEALING" Their Motto.

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**INSPECTED FOUNDRY IRONS . . . . .**

ALSO

**Sole Factors for DUNBAR STRONG IRON**

In New York and New England.

**FURNACES, PITTSBURGH.**

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

**DEAL WITH THE MANUFACTURER DIRECT.**

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A FIRST CLASS LINE FOR FIRST CLASS TRAVEL.

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"As near perfection in the way of construction, appointments, service and able management as can be conceived in modern railroading.—*Extract from report of Railroad Commissioner, State of Michigan.*

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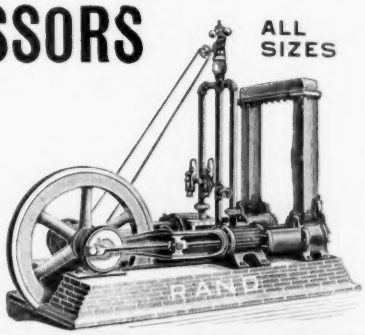
**FOR FOUNDRIES.**

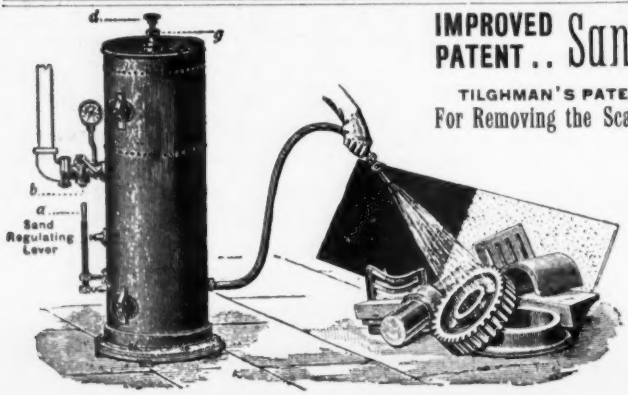
SIMPLE. DURABLE. ECONOMICAL.

Our **Duplex Compressor,** Compound Air Cylinders, with Inter-Cooler and Compound Steam Cylinders, with Meyer Cut-off Valves, is the best construction for small and medium sizes.

**RAND DRILL CO.**

Don't forget our Rock Drills. 100 Broadway, NEW YORK.

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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc.

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# There is no Escape

from financial loss for the man who will persist in throwing castings away simply because . . they contain a small hole or leak.

SMOOTH ON will cure permanently 90% of all the defects found in castings. It will stick to the casting till doomsday and even experts cannot tell the difference between a perfect casting and one made perfect by SMOOTH ON.

Write for a Sample Can today. It is the handiest thing you ever saw around a foundry.

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## OUR CATALOGUE

OF THREE HUNDRED PAGES ILLUSTRATING AND DESCRIBING A LARGE NUMBER OF

BRIDGES
BUILDINGS
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Designed and Built by us

Is now ready and will be sent on application.

THE BERLIN IRON BRIDGE CO.
EAST BERLIN, CONN.

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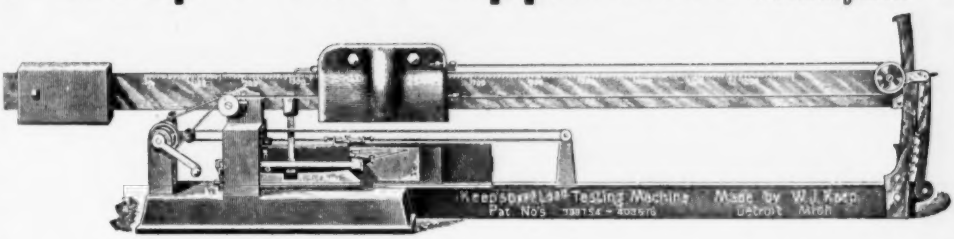


76 Yanners, Ramsbottom, Lancashire, Eng.
August 30, 1898.

*Mr. W. J. Keep,*

DEAR SIR—I have for some time past been trying to keep my iron of one quality, but owing to the different qualities of scrap, I am unable to do so, and I am advised to use **"Keep's Test" Apparatus.** Please send description.

Yours respectfully, JOHN CALLISTER.

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Detroit, Mich., Sept. 12, 1898.

*Mr. John Callister:*

DEAR SIR—I hereby send descriptive circulars. There are three manufacturers of looms at Oldham, near you, using **"Keep's Test" Apparatus.** Call upon Messrs. Hutchinson, Hollingsworth & Co., Ltd., at Dobcross. Last month I shipped a set of apparatus to Messrs. Asa Lees & Co., Oldham.

Yours truly,
W. J. KEEP.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

**USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.**

Write for information.

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ELIZABETH, N. J.

ESTABLISHED 1875.

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INVENTORS OF THE

**FLEXIBLE SHAFT**

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

**PORTABLE EMERY GRINDER**

Take the tool to the work and save heavy handling.

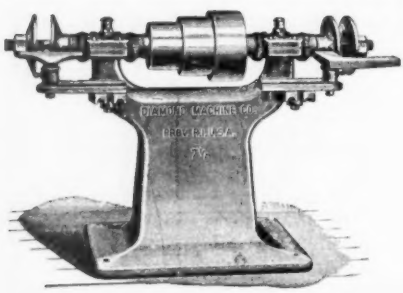
WRITE US FOR CATALOGUE AND PRICES

BE WISE

## THE GOBEILLE PATTERN COMPANY

(PROMPT AND RELIABLE)

CLEVELAND, OHIO



No. 7½ GRINDER.

## *This Grinder*

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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ENGINEERS AND CONTRACTORS,

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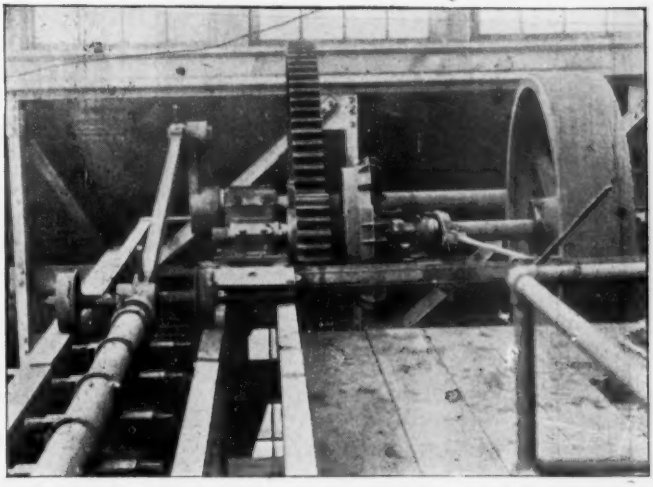
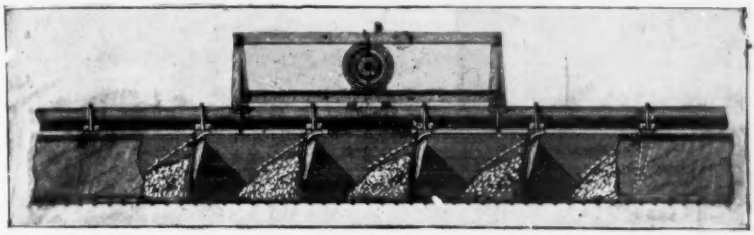
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.

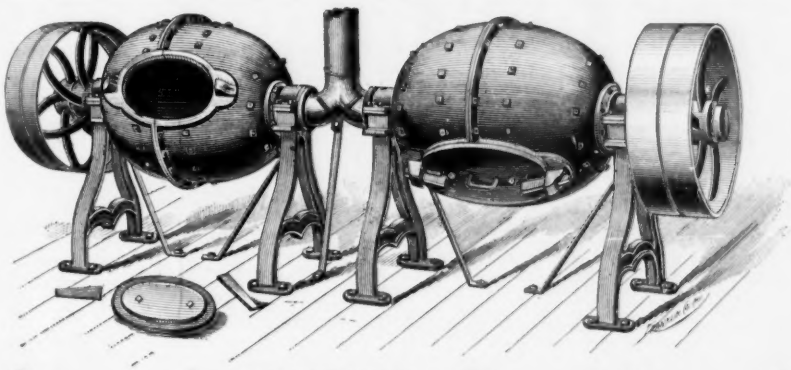




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

PATENTS PENDING.

**Complete Installations.**



# A Fine Pair

# Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

## Stover Manufacturing Co.

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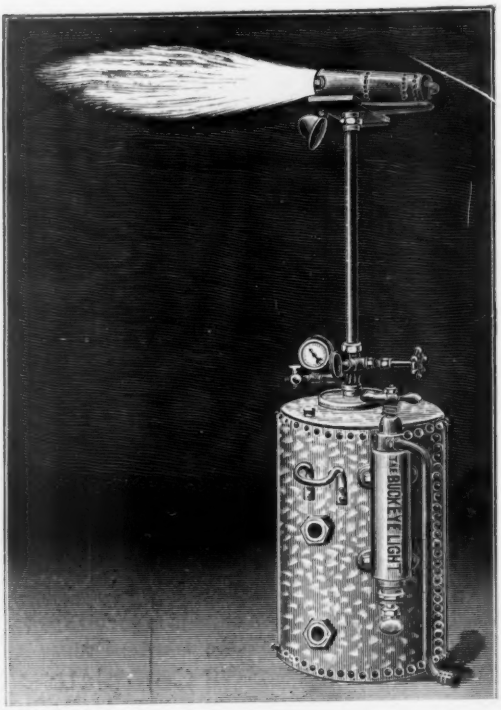


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# Buckeye Light

FOR

# FOUNDRY LIGHTING

**The Only Light that will penetrate smoke and Steam.**

**IS PORTABLE.**

**Flame can be adjusted Vertical or Horizontal.**

Send for copies of Testimonials to

## Macleod & Clark,

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457-463 E. Front St., CINCINNATI, O.

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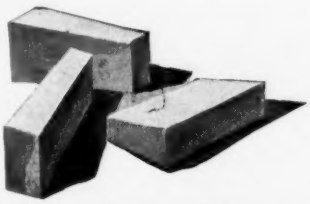
# Have you ever seen the record

Made by blast furnace No. 1, Ensley, Alabama? This furnace ran continuously four (4) years and two (2) days and made 253,533 tons of pig iron.

The greatest record ever made by any furnace in the South.



This furnace was lined exclusively with "FRANKLIN CROWN" and "SLIGO" Fire Brick. The best on earth. This record is equal to double the amount of northern ore.

**Garden City Sand Co.,** * * SECURITY BUILDING, CHICAGO.

Exclusive agents for the Northwest.

DO YOU MAKE LIGHT OR HEAVY

## Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

## McCORMICK'S EXCELSIOR BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

**J. S. McCORMICK CO., PITTSBURG, PA.**

# A GREAT BARGAIN

600 No. 35 Black Lead Crucibles, best make, used only once or twice for melting nickel, and as good as new for ordinary Brass Foundry Work. Write for particulars . .

**THE HANSON & VANWINKLE CO.,**

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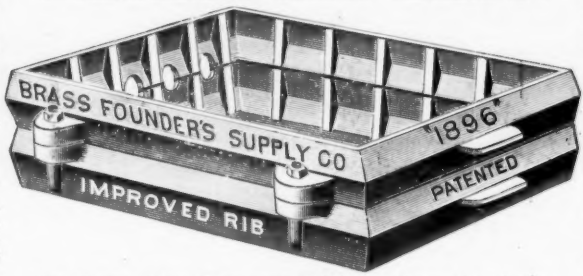
ARE ALL RIGHT.

SO . ARE . PRICES.

Send for catalogue if interested. ∴ Send sample for Prices on Gray Iron Castings Our **Furnaces**, round steel shell, with drop grate, are up to date.

**LATEST and BEST.**

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We make . . **Clamps, Boards** and **Other Supplies Castings, too.**

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**FOX UNIVERSAL TRIMMERS**

OUR No. 8 F. Cut 8 inch high; 24½ inch long.

Accurate pattern construction made easy.

**Buy of the Original Manufacturers.**

We make ten sizes. Over 11,000 sold.

See if you have plenty of these tools in your pattern shop. **Remember we offer to send you any size on trial.**

**PRICES REDUCED;** write for them.

New illustrated catalogue just out.

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# Molder's Text Book

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AMERICAN FOUNDRY PRACTICE,

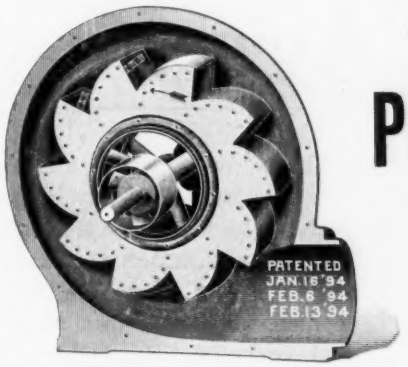
Presenting the Best Methods and Original Rules for obtaining Good, Sound, Clean Castings and giving Detailed Description for Making Molds Requiring Skill and Experience; also containing a Practical Treatise upon the Construction of Cranes and Cupolas, and the Melting of Iron and Scrap Steel in Iron Foundries.

**By THOMAS D. WEST,**

Practical Iron Molder and Foundry Foreman, Member of the American Society of Mechanical Engineers, and of the Civil Engineers' Club of Cleveland, O.

461 PAGES. FULLY ILLUSTRATED.

**Price, $2.50, Postpaid; With THE FOUNDRY, One Year, $3.00.**




# J. B. & J. M. CORNELL,

Manufacturers of POOLE'S PATENT

# Pressure Blowers and Exhausters

**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

**A COMPARATIVE TEST** between one of our Blowers (referred to as Blower "A") and one made by one of the best known makers in this country (referred to as Blower "B") was made by Prof. Denton, of Stevens Institute of Technology, Hoboken, N. J.

Prof. Denton says: "The general conclusions to be drawn from the experiments are: (1st) That for pressures varying from two to fourteen ozs. and quantities of air varying from 2,500 to 6,500 cubic feet per minute, Blower A delivered from 7 to 28 per cent. more air per horse power than Blower B. (2) That over the same range of pressures and volumes, Blower A utilizes in producing pressures from 6 to 60 per cent. more velocity of its blades than Blower B."

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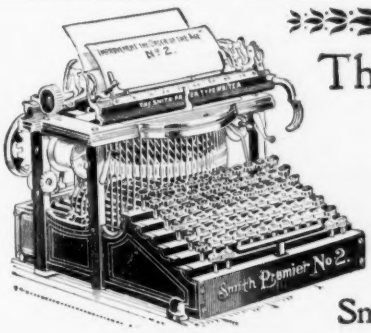
**WRITE FOR PRICES.** **WORKS—Cold Spring-on-the-Hudson, N. Y.**

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THE SIMPLE, DURABLE,
EASILY OPERATED,
MECHANICALLY SUPERIOR
WRITING MACHINE.

Send for New Art Catalogue.

Smith Premier Typewriter Co.,
105 Griswold Street, DETROIT, MICH.

**WE HAVE IT!**
THE FINEST SERVICE BETWEEN

# Detroit and Cincinnati

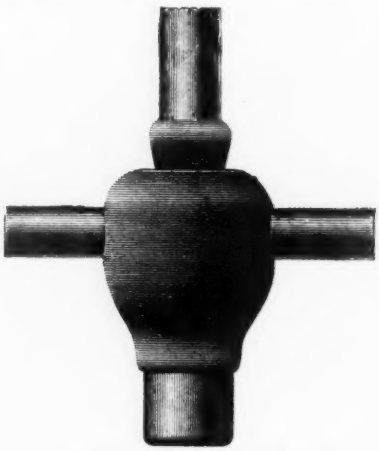
VIA

# LAKE SHORE—BIG FOUR LINE

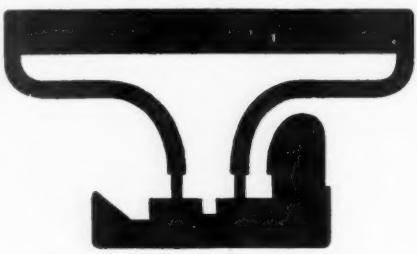
Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

E. O. McCORMICK, Pass. Traffic Manager, CINCINNATI. H. J. RHEIN, General Agent, DETROIT.

# Ten Years Ago ..



Here are some of the Cores we make without Vents—do not need them . . . . . .



it would be very hard to find a foundryman who used anything but flour — good XXX flour, mind you—with which to make cores. Some of them wanted beer also, and there is a wide spread suspicion that all the beer bought did not get into the cores, either.

# Nowadays ..

it is different, and it is even harder to find an up-to-date, first-class foundryman who uses flour than it was before to find one who would do without it.

**Here is one of the reasons for the . . change . . . . . .**

**A Dollar's worth of our Oil Compound will make more Cores than a Dollar's worth of Flour and the Cores will never blow.**

**Compared with Flour, our Compound costs nothing, as it more than saves its entire cost . . . . . .**

SEND FOR SAMPLE

**Holland Linseed Oil Co** 683 Austin Avenue, CHICAGO

# BUY THE ORIGINAL AND BEST

We make the STANDARD facings and Blackings known the world over. ALL CRUDE MATERIALS ARE ANALYZED and thoroughly tested ere they enter the manufacture, so you will always get "value received" from us.

# THE S. OBERMAYER CO

CINCINNATI, O. Telephone 7873.

CHICAGO, ILL. Canal 308.

Direct telegraphic communications to our offices.
Cable address, "ESSO"—Cincinnati.

THE LARGEST AND MOST RELIABLE FOUNDRY SUPPLY HOUSE IN THE WORLD.

We have everything you need in your foundry—

FACINGS, BLACKINGS, CORE WASH, BRASS SAND, CRUCIBLES, PLUMBAGO, SILVER LEAD, TALC, FIRE BRICK, MOULDING SANDS, ETC.

Also—

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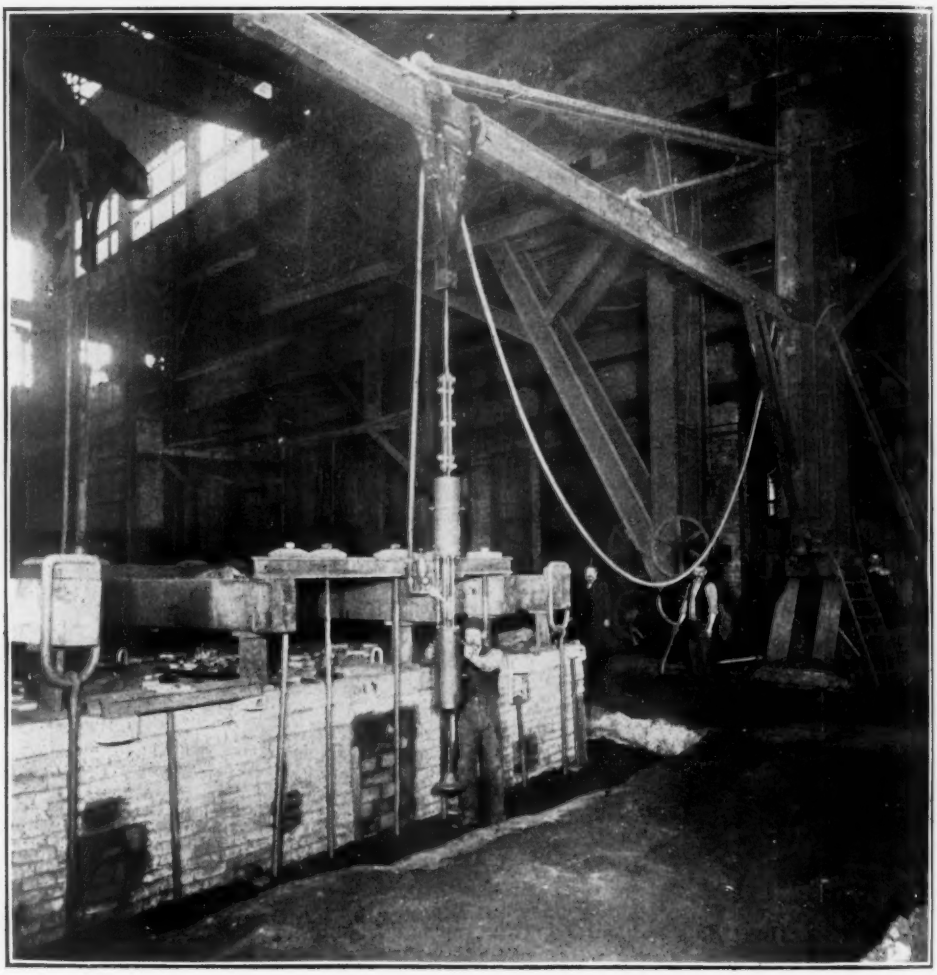
Have you Catalogue No. 26? If not, write for same and mention "THE FOUNDRY."

# Cramp Pneumatic Rammer



Invented to save labor in ramming up a mold.

Swung upon a light crane attached to the side of the building or from a post.

A trolley gives it two motions, in-and-out and circular, covering every inch of surface in a radius of 25 or 30 feet.

Can be run by air or steam, compressed air preferable. With a pressure of about forty pounds it strikes 250 times a minute or as desired.

One man handles it with ease and does the work of a dozen by hand ramming.

The sand or dirt is packed with an even pressure.

The mold is secured beyond a doubt and saves metal by uniform ramming.

The mold is rammed up in one-third the time.

No well equipped Foundry can afford to be without this machine.

For further particulars, apply to

**J. W. Paxson Co.**

1021 North Delaware Avenue,
PHILADELPHIA, PA., U. S. A.

A NEW IDEA! Foundrymen! Control the Gear Business in Your Own Locality!
Graves' Portable Coop Molding Machine

# A NEW IDEA!

**Foundrymen! Control the Gear Business in Your Own Locality!**

The day of costly patterns, destructive rapping, and teeth-with-draft is passing; the machine molded gear, made without pattern, and with draftless teeth is here to stay. Why let outsiders ship fine machine molded gears to your next door neighbor, and catch other work?

UNIVERSAL GEAR MOLDING MACHINE. (GROVES' PATENT.)

The machine illustrated above is described as Universal, because it is perfectly adapted for the molding of Spur, Bevel, Helical, Staggered or Worm Toothed Gearing (internal or external) from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts, except tooth block,

# Groves' Portable Gear Molding Machine

**No Jobbing Foundry can afford to be without it. Others use it, why not you?**

This simple, economical and inexpensive appliance is adapted for molding the teeth of large gears from 3½ inches up to 24 feet in diameter and any face; also rims of Belt and Rope-Driving Pulleys, Band and Fly Wheels, etc., doing away with large, expensive full patters and can be removed from the foundry floor in a few minutes after the mold is formed, thus leaving valuable space ready for other work.

**Apply for Price, etc., to the . . Exclusive Agents . . . . . J. W. PAXSON CO. 1021 N. Deleware Avenue, PHILADELPHIA, PA.**

# 50 Years Ago!

**50 years ago Joseph Dixon received the above medal for Crucibles of an Excellent Quality.**

THAT wasn't the first nor the last medal received, as the **Dixon Crucibles** have won medals and testimonials from all parts of the world, during the seventy years they have been made.

**Seventy years of experience** and the best equipped factory in the world explain the reason why we are able to make the best black lead crucibles in the world.

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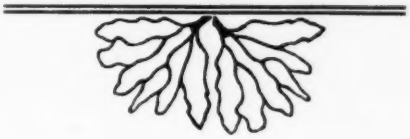
# Whitehead Brothers Company,

DEALERS IN

# Molding Sand



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PHILADELPHIA SAND
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FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
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OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Castings.**

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That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

## Chicago Pneumatic Tool Co.,

**635 Monadnock Building, CHICAGO, ILL.**

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CAPITAL, PAID UP, $500,000.

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300 30-TON COAL CARS — 50 30-TON COKE CARS.

**Foundry Coke Our Specialty.**

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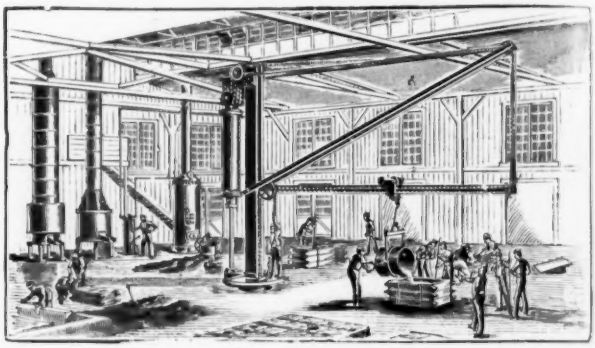
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

# Buildin' Her Bigger, Eh?

Well, brother, if that is what you are going to do, you must not fail to look into the Ridgway Steam Hydraulic Crane when the crane matter comes to be decided.

If it is your foundry you are enlarging or changing, don't make the tremendous mistake of getting into your head that a traveling crane is the sort for your foundry just because it is the only sort for a machine shop. The conditions of a foundry are very different from those of a machine shop A crane in a foundry is not there primarily to move stuff up and down the shop, but to help molders get up lots of work quick and have it all good when poured. The laborers will take the stuff up and down the shop all right at small cost.

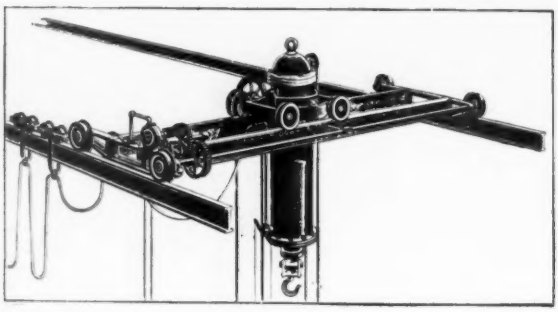


5-Ton Steam Hydraulic Crane in a Foundry.

If the Ridgway Crane had been invented 10 years before it was, but few people would think of putting travelers in foundries. Everybody would have known the Ridgway Crane, and when people know it they don't want travelers for foundries—they want Ridgway Cranes. Foundries which put in travelers soon find they can get no work done until they put swing cranes along the runway to help the travelers. Visit such shops and see.

The Ridgway Crane is the ideal crane for foundry service and the largest and best plants have been finding this fact out and installing Ridgway Cranes as fast as we can make them. It is worth your while to investigate it.

## AIR HOISTS—JUST ONE



is all we solicit an order for. One of them at work is our best salesman. The Ridgway Hoist is governed by a little oil, and becomes a safe and perfect machine. Costs more than a plain hoist, but is worth the difference in price ten times over. Can use it on most delicate foundry work and is safe in any hands. Get our circular and find out about it. We won't bore you. Don't have any one "on the road." If you are not smart enough to appreciate the advantage of an air hoist which is not an air gun, no drummer is likely to change you.

## "PLEASE TAKE THE ELEVATOR."

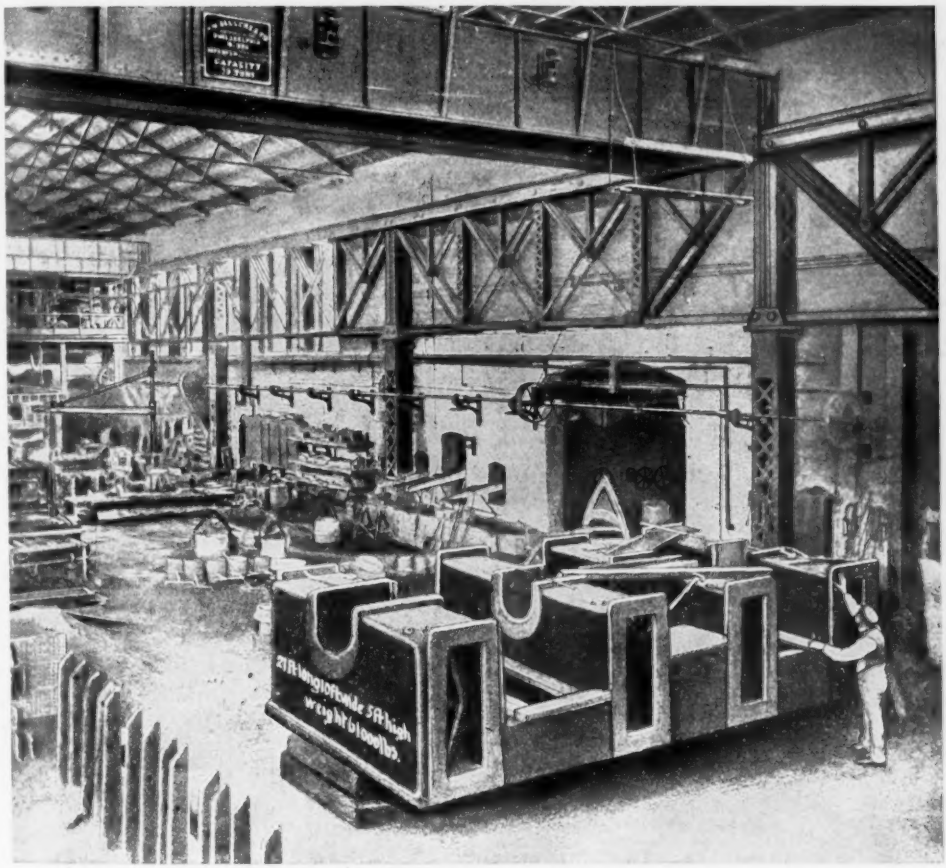
This is about all we say about it, but you ought to see the many who are taking it.

## CRAIG RIDGWAY & SON, COATESVILLE, PA.

# William Sellers & Co. Incorp.

PHILADELPHIA.

# MODERN FOUNDRY MACHINERY

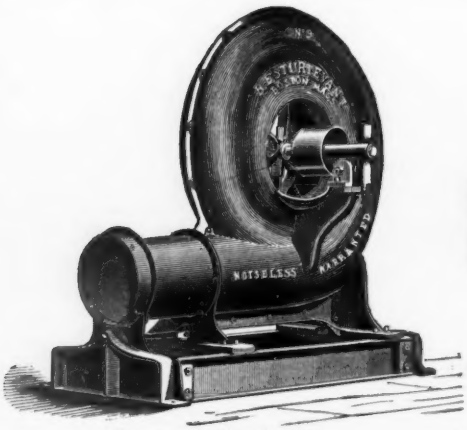



In the last issue of THE FOUNDRY we presented a view of our main foundry (204x80 feet) showing in the foreground a green sand mold of large dimensions, with complicated cores, intended for the bed plate of an air compressor for the Calumet and Hecla Mining Company. We give herewith another view of the same foundry showing the casting that was made in this mold.

The handling of such large and heavy work is often a difficult problem to solve in any foundry that is equipped with old fashioned jib cranes. Two electric traveling cranes, one of 30 tons capacity, the other 26 tons, now handle all our work in our foundry with economy and dispatch—having displaced two 50-ton jib cranes, three 25-ton jib cranes, and three 10-ton jib cranes.

We build modern foundry cranes of all kinds, with all kinds of motive power and of all sizes.

We are prepared to meet all possible requirements as to capacity, speed, etc., etc., and any method of driving, and with the **assurance in each case of SAFETY and ECONOMY in working and with least cost for maintenance.** Correspondence on the subject is solicited.




Blower on Adjustable Bed.

# THE STURTEVANT STEEL Pressure Blowers,

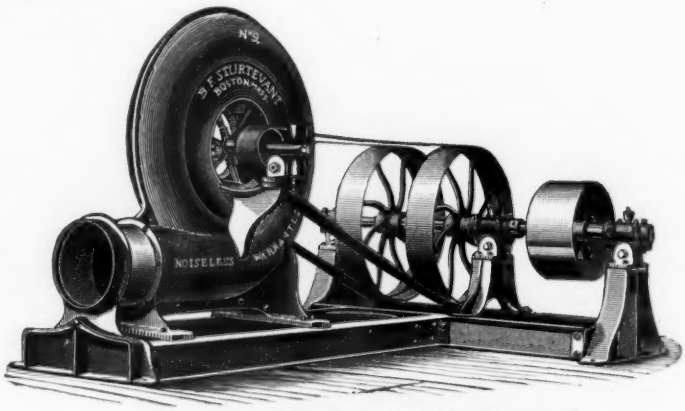
—FOR—

Cupola Furnaces and Forge Fires.

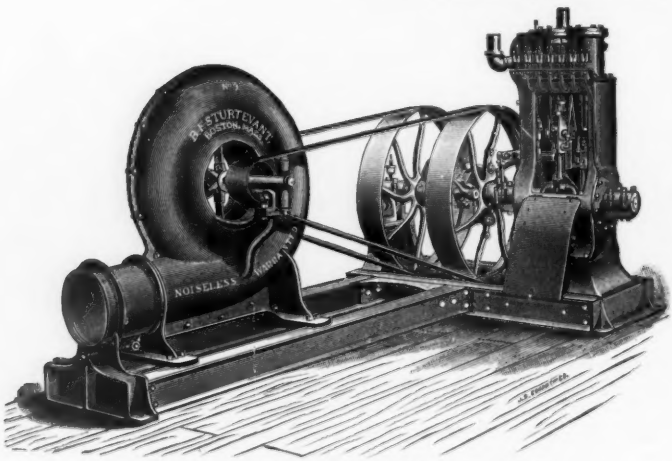
## BLOWERS

Furnished without Bed with Separate Countershaft

## BLAST GATES




Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

## BLOWERS

WITH

THE STURTEVANT

Direct Connected

## Electric Motors

Send for Catalogue.

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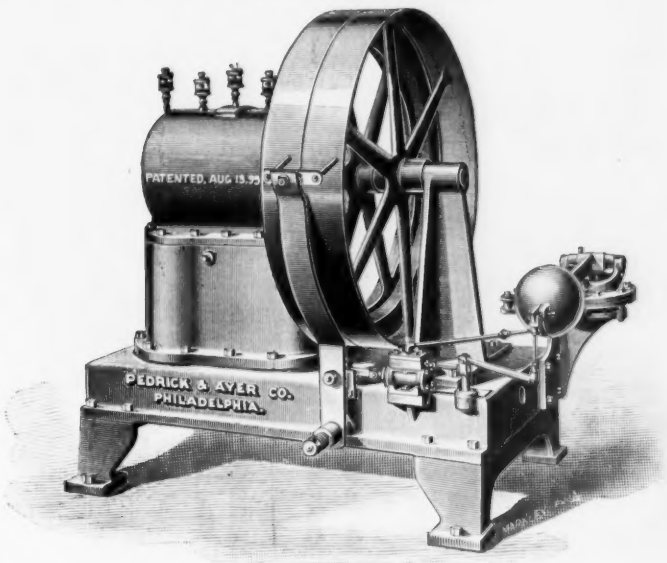
# Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.




**Straight Lift Hoist.** **Built in two sizes, Nos. 1 and 2.**

| No. | Size of Cylinders in inches | Revolutions per Minute. | Cubic Feet of Free Air | Horse Power Required. | Size of Pulleys in inches | Shipping Weight of Compressor | Floor Space in inches | Telegraphic Symbol |
|---|---|---|---|---|---|---|---|---|
| 1 | 11x 6 6x 6 | 100-160 | 32- 50 | 2-3½ | 40x5 | 2875 lbs. | 60x40 | Parian |
| 2 | 15x10 8x10 | 90-120 | 90-120 | 9-15 | 60x6 | 5370 lbs. | 76x60 | Parish |

**HORIZONTAL HOIST.**

PAT. SEPT. 4TH 1894.

**AIR HOSE COUPLING**

**For ⅛ inch, ¼ inch and 1 inch Hose.**

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage possible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

**Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.**

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# Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

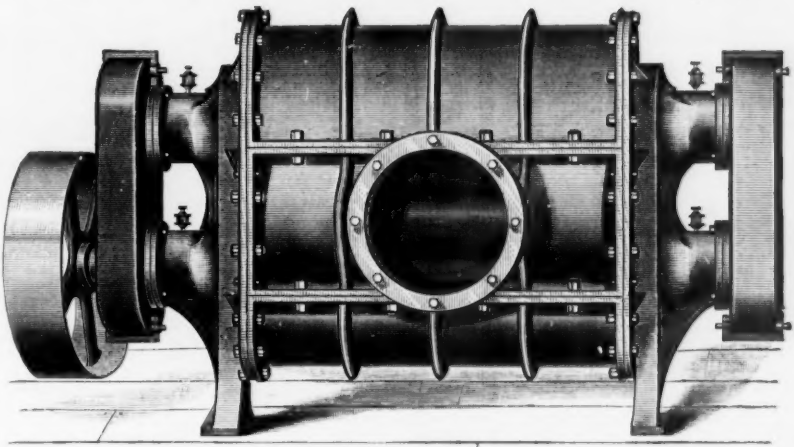
We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

## We make All Sizes, from 8 oz. to 2 ton Capacity.

# ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

# The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

## High Pressure Blowers

GAS EXHAUSTERS

## Exhausters for Hot Gases

**The GREEN Gives the Most Value for a $.**

# Wilbraham Baker Blower Co

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800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

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**PORTABLE, SELF-CONTAINED, AUTOMATIC.**

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

## Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

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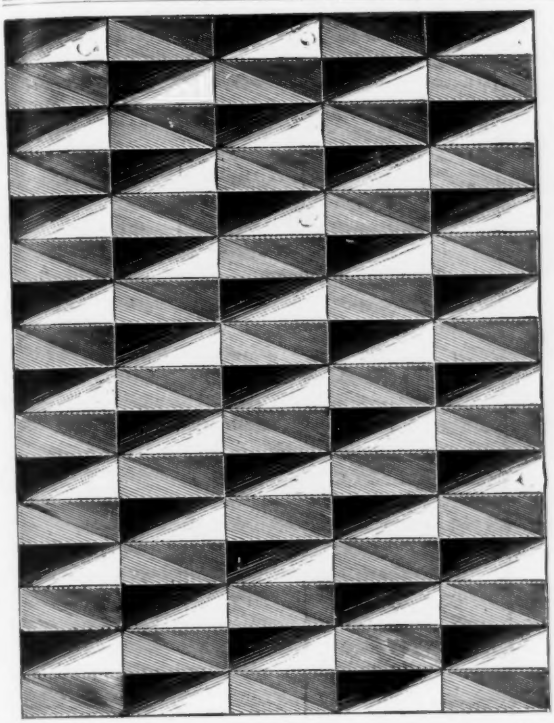
ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

*The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:*

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.



The above cut shows exact size of Diamonds.

# Diamond Pattern Lumber,

—FOR—

**DOOR SILLS, PLATFORMS, STEP PLATES, Etc.**

This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide and ½ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

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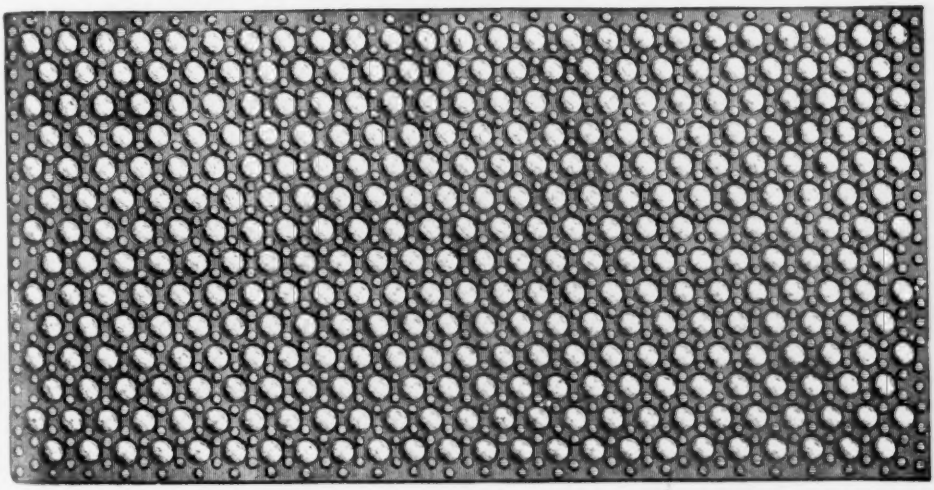
## PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

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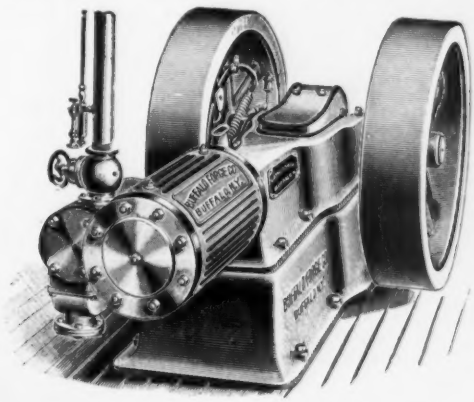
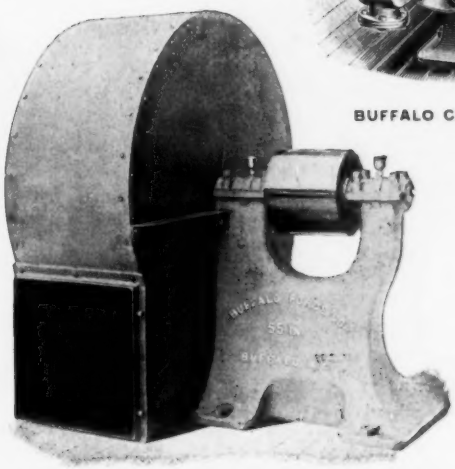


BUFFALO CLASS "A" AUTOMATIC ENGINE



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Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Catalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

BUFFALO CUPOLA BLOWER.

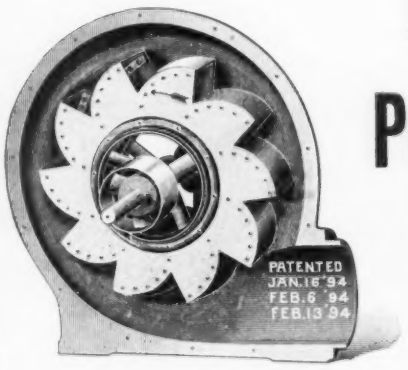
# Buffalo Forge Company,

BUFFALO, N. Y.

# ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 26 |
| Addy & Co., Matthew | 16 |
| American Glutrose Works | 24 |
| Ayers, E. M. | 21 |
| Barnett, Estate of Oscar | 26 |
| Berlin Iron Bridge Co. | 27 |
| Big Four R. R. | 27 |
| Brooklyn Fire Brick Works | 25 |
| Buffalo Forge Co. | 19 |
| Case Mnfg. Co. | 23 |
| Chicago Pneumatic Tool Co. | 6 |
| Clinton Iron & Steel Co. | 25 |
| Clement, F. H. | 31 |
| Connersville Blower Co. ..... Back Cover | |
| Cornell, J. B. & J. M. | 20 |
| Cowles Electric Smelting and Aluminum Co. Inside Back Cover | |
| Dayton Coal & Iron Co. | 16 |
| Diamond Machine Co. | 28 |
| Dixon Crucible Co., Joseph | 4 |
| Domhoff & Joyce Co., The | 16 |
| Fox Machine Co. | 31 |
| Garden City Sand Co. | 30 |
| Gobeille Pattern Co. | 28 |
| Goodrich & Co., F. A. | 16 |
| Gould & Eberhardt | 24 |
| Hanna & Co., M. A. | 16 |
| Hanson & Vanwinkle Co. | 33 |
| Heyl & Patterson | 29 |
| Holland Linseed Oil Co. | 34 |
| Hussman Crucible Co. | 24 |
| Irwin & Co., James | 22 |
| Keep, W. J. | 32 |
| Kelly & Co., T. P. | 22 |
| Mack, Thomas | 16 |
| McCormick & Co., J. S. | 30 |
| McCullough-Dalzell Co. | 17 |
| Michigan Cent. R. R. | 33 |
| Miller, Wagoner, Fieser & Co. | 16 |
| Millett Core Oven Co. | 21 |
| Mohr, J. J. | 16 |
| Obermayer Co., The S. Inside Front Cover and Page | 1 |
| Paxson Co., J. W. ..... 2 and | 3 |
| Pedrick & Ayer | 11 |
| Penn, R. R. | 32 |
| Pickands, Brown & Co. | 16 |
| Pilling & Crane | 16 |
| Pridmore, Henry E. | 16 |
| Rand Drill Co. | 26 |
| Ridgway & Son, Craig | 8 |
| Rogers, Brown & Co. | 16 |
| Roots Company, P. H. & F. M. ....Colored Insert | |
| Sellers & Co., Wm. | 9 |
| Smith Premier Typewriter Co. | 33 |
| Smooth On Mnfg. Co. | 13 |
| Springfield Facing Co. | 13 |
| Springfield Foundry Co. | 13 |
| Standard Sand Co. | 15 |
| Stevenson, Field & Co. | 16 |
| Stewart, W. H. | 15 |
| Stover Manufacturing Co. | 18 |
| Stow Manufacturing Co. | 18 |
| Sturtevant Co., B. F. | 10 |
| Superior Charcoal Iron Co. | 24 |
| Tabor Mnfg. Co. | 28 |
| Taylor & Son, Robert J. | 12 |
| Ward & Nash | 26 |
| Washington Coal & Coke Co. | 7 |
| Wells Light Mnfg. Co. | 14 |
| Whitehead Bros. Co. | 7 |
| Whiting Foundry Equipment Co. | 18 |
| Wilbraham Baker Blower Co. | 13 |



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Manufacturers of POOLE'S PATENT

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**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

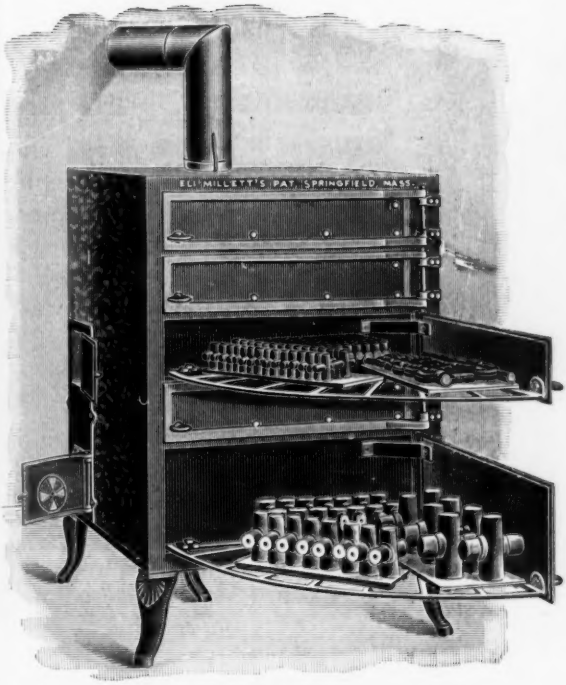
**A COMPARATIVE TEST** between one of our Blowers (referred to as Blower "A") and one made by one of the best known makers in this country (referred to as Blower "B") was made by Prof. Denton, of Stevens Institute of Technology, Hoboken, N. J.

Prof. Denton says: "The general conclusions to be drawn from the experiments are: (1st) That for pressures varying from two to fourteen ozs. and quantities of air varying from 2,500 to 6,500 cubic feet per minute, Blower A delivered from 7 to 28 per cent. more air per horse power than Blower B. (2) That over the same range of pressures and volumes, Blower A utilizes in producing pressures from 6 to 60 per cent. more velocity of its blades than Blower B."

**OFFICE AND WORKS—26th St. and 11th Ave., NEW YORK CITY.**

WRITE FOR PRICES.

**WORKS—Cold Spring-on-the-Hudson, N. Y.**




# Millett's Patent Core Oven

**Double Doors,**
**One closing the oven when the other is open.**

**THE BEST IN THE WORLD.**

**No Foundry using small Cores can afford to be without it.**

**Over two hundred in use.**

*Send for our new Catalogue giving names of those using them.*

## Millett Core Oven Co.

**BRIGHTWOOD, MASS.**

For Sale by THE J. W. PAXSON CO., Philadelphia, Pa., and THE S. OBERMAYER CO., Chicago, Ill.

# When People

handle anything as a side line, it is liable to be neglected and attended to only when there is nothing else to claim attention.

This is as much true of molding sand as anything else. Carelessness in selection and mining will cause the foundryman untold annoyance later on.

We put our whole time into the mining and shipping of molding sand. We are specialists in our line and you know the specialist is the man who gives satisfaction both in price and quality.

WESTERN AGENT—

**E. M. AYERS, ZANESVILLE, O.**

**H S. VROOMAN, 220 W. 20th St., CHICAGO.**

Rights to use these machines for molding malleable iron or steel castings are reserved.

## In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

## Which do you wear most

your thinking cap or your working cap? The foundryman who studies to save himself labor and expense, who strives to have his castings make the best possible appearance, finds nothing so helpful as

# Kelly's Plumbago

It does the work on all grades of castings and a dollar's worth of it goes further than a dollar's worth of any other man's plumbago.

Samples, if you write for them.

**T. P. Kelly & Company,** MILLS AT . . Reissing, Pa. Bloomsbury, N. J.

WESTERN OFFICE and MILLS: 544-546 W. 22nd St., NEW YORK, N. Y.
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# JAMES IRWIN & CO

MANUFACTURING CHEMISTS,

343 Sixth Avenue, PITTSBURGH, PA.

## SULPHURIC ACID
## HYDROFLUORIC ACID

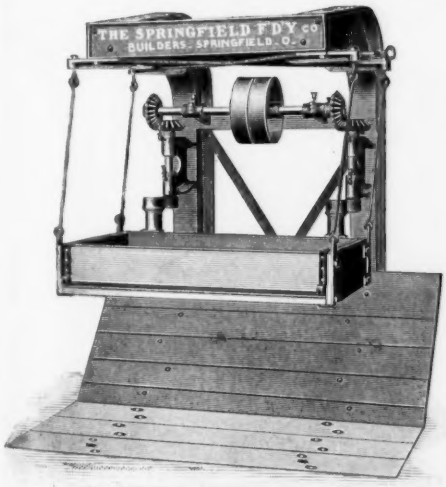
FOR CLEANING CASTINGS.

Hydrofluoric Acid is replacing Sulphuric Acid and the Tumbling Barrel with progressive foundrymen for cleaning castings. It DISSOLVES THE SAND instead of the iron, and is convenient to handle, being shipped in barrels, or in lead carboys.

SOLE AGENTS FOR

## Kentucky Fluor Spar Co.'s

HIGH GRADE FLUOR SPAR FLUX
FOR IRON FOUNDRIES
AND BLAST FURNACES.




THE PERFECT

## Sand Riddling Machines

BOTH HAND AND BELT POWER.

These are the Best, Simplest, Most Durable and Most Easily Operated Sand Riddling Machines made. For full particulars and references, address,

The Springfield Foundry Co., SPRINGFIELD, OHIO.

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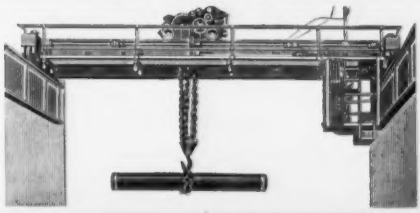
## CRANES AND HOISTING MACHINERY



## ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO
COLUMBUS, OHIO.

# Running Day and Night.

Our three blast furnaces—PIONEER, ANTRIM, ELK RAPIDS—are making 2500 tons a week of **Lake Superior Charcoal Pig Iron** that is especially adapted for all kinds of

## Malleable Work and Car Work.

High irons a specialty.
Get prices while navigation is open.

## Superior Charcoal Iron Co

GRAND RAPIDS, MICH.

# CORE COMPOUND

# GLUTROSE

(Trade Mark.)

## The Universal Liquid Core Compound

**Patented in the United States, England, France and Belgium.**

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience, It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil, molasses or any other compound in use; takes the place of all other materials and never varies in quality.

WILL MAKE FIRST-CLASS RADIATOR CORES WITHOUT RODDING.

WHY PAY 30 to 40 CENTS FOR LINSEED OIL WHEN THE SAME RESULTS CAN BE OBTAINED FOR HALF THE MONEY?

**WILL NEVER BLOW THE CASTINGS.**

## AMERICAN GLUTROSE WORKS

**Sole Manufacturers.**
OFFICE: PENN MUTUAL BUILDING,
**No. 925 Chestnut St., Philadelphia.**

WE MANUFACTURE

# PLUMBAGO CRUCIBLES

FOR MEN THAT

**UNDERSTAND**

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

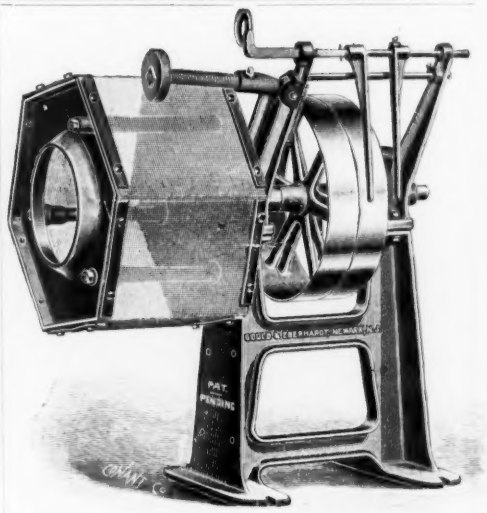
## Ceylon Plumbago

PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

**We keep it for sale.**

## Hussman Crucible Co.

ST. LOUIS, MO.




## EBERHARDT'S IMPROVED AUTOMATIC SAND SIFTER.

*Messrs. Gould & Eberhardt, Newark, N. J.:*

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

BELL & FYFE FOUNDRY CO.

## GOULD & EBERHARDT, NEWARK, N. J.

# A MOLDER'S DUTY!

THE Molder who not only puts up his regular day's work, but takes interest enough in his employer's welfare to notice when he can save the firm a little that might be wasted, is the one who in the end is sure to gain by it. If you have some little improvement that will save time or expense, explain it to your foreman and do what you can to make the shop turn out good work so they can compete with other shops. Thousands of brass molders have decided that the best charcoal facing or parting ever used is manufactured by Springfield Facing Co. If you do not find it in your shop, it is your duty to tell your boss about it. Tell him we will send a sample barrel and if not entirely satisfactory they need not pay for it. Our Stove Plate Charcoal also leads the market. : : : : : : :

**SPRINGFIELD FACING CO., SPRINGFIELD, MASS.**

# SOMETHING VERY NEW!

Did you ever have a Molding Sand purified, refined and graded as uniformly as hats, shoes or bar iron? That is what we furnish, and for fine work it is far cheaper and better than anything ever before offered. No water for sale—our sand is weighed and shipped DRY. Write for samples and prices.

**STANDARD SAND CO.,**

H. G. BOUGHTON, Manager. EVERETT, SUMMIT CO., OHIO.

# Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

**"CLINTON" AND "HECTOR"**

**INSPECTED FOUNDRY IRONS . . . . .**

ALSO

**Sole Factors for DUNBAR STRONG IRON**

In New York and New England.

**FURNACES, PITTSBURGH.**

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

DEAL WITH THE MANUFACTURER DIRECT.

ESTABLISHED 1854.

# Brooklyn Fire Brick Works

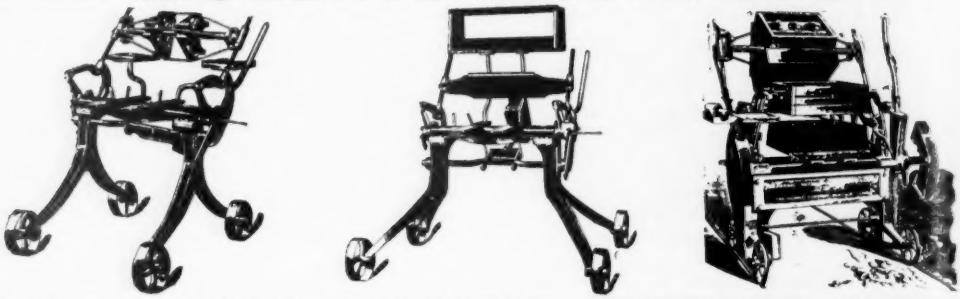
CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y.

FARWELL'S **MOLDING MACHINES** Send for Catalogue



THE ADAMS COMPANY, DUBUQUE, IOWA

*Estate of Oscar Barnett.*

BRUEN, HAMILTON and McWHORTER STREETS
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Manufacturers of Supplies for BRASS FOUNDRIES.

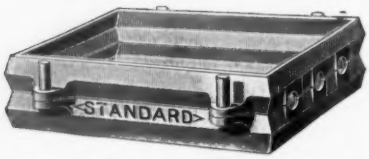
**<Standard> Flask.**

Not milled with Emery Wheels, but accurately planed

Which is your choice. We make both styles.

*ESTABLISHED 53 YEARS*

**Ribbed Flask.**




Finished Hardware Specialties to Order.

Low Quotations Promptly Furnished.

**RAND AIR COMPRESSORS**

**FOR FOUNDRIES.**

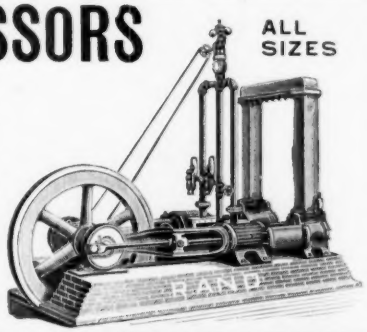
SIMPLE. DURABLE. ECONOMICAL.

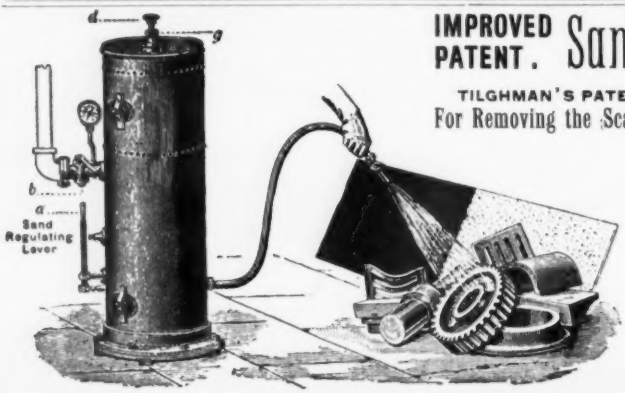
Our **Duplex Compressor,** Compound Air Cylinders, with Inter-Cooler and Compound Steam Cylinders, with Meyer Cut-off Valves, is the best construction for small and medium sizes.

**RAND DRILL CO.**

Don't forget our Rock Drills. 100 Broadway, NEW YORK.

ALL SIZES




**IMPROVED PATENT. Sand Blast Machinery**

TILGHMAN'S PATENTS MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

**WARD & NASH,**

SOLE AGENTS,

35-37 So. Canal Street, CHICAGO.

23-25 Purchase St., BOSTON.

Send for Catalogue.

## There is no Escape

from financial loss for the man who will persist in throwing castings away simply because . . they contain a small hole or leak.

SMOOTH ON will cure permanently 90% of all the defects found in castings. It will stick to the casting till doomsday and even experts cannot tell the difference between a perfect casting and one made perfect by SMOOTH ON.

Write for a Sample Can today. It is the handiest thing you ever saw around a foundry.

**SMOOTH ON MFG. CO.,**
VREELAND TOMPKINS, Mgr.
551 COMMUNIPAW AVE., JERSEY CITY, N. J.

# Iron Roof for Sale

Width of building, 155 feet out to out; divided into a center span 66 feet, with a wing on each side 43 feet, 6 inches; total length of the building, 350 feet. This building is designed with brick sides and gable walls, with iron roof trusses and iron supporting columns; originally built for an Iron Foundry, but owing to the failure of the purchaser, is now offered for sale at a bargain. Is admirably adapted for a Foundry for light or heavy castings, Machine Shop, Car Barn, or for any other general manufacturing purposes. We guarantee the iron work as good as new, building never having been used.

Apply to

**The Berlin Iron Bridge Company,**
EAST BERLIN, CONN.

## W. H. STEWART'S
# LIQUID CORE COMPOUND

Used by many of the largest and well-known Iron and Brass Foundries in the United States, Canada, Great Britain and Germany. It is the standard article for making cores.

Send for Decriptive Circular.

**W. H. STEWART, 105 JOHN STREET, NEW YORK.**

**WE HAVE IT!**
THE FINEST SERVICE BETWEEN **Detroit and Cincinnati**
VIA
# LAKE SHORE—BIG FOUR LINE

Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

E. O. McCORMICK, Pass. Traffic Manager, CINCINNATI. H. J. RHEIN, General Agent, DETROIT.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

**USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.**

Write for information.

# The Tabor M'f'g Co.,

**ELIZABETH, N. J.**

ESTABLISHED 1875.

## STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

**FLEXIBLE SHAFT**

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

## PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

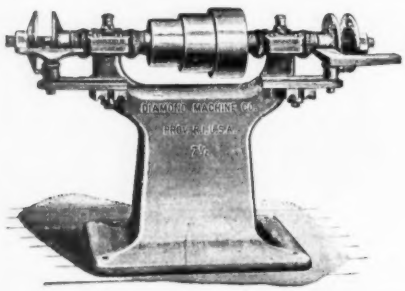
WRITE US FOR CATALOGUE AND PRICES.

BE WISE

## THE GOBEILLE PATTERN COMPANY

(PROMPT AND RELIABLE)

CLEVELAND, OHIO



No. 7½ GRINDER.

## *This Grinder*

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

DIAMOND MACHINE CO. Providence, R. I.

# Heyl & Patterson

ENGINEERS AND CONTRACTORS,

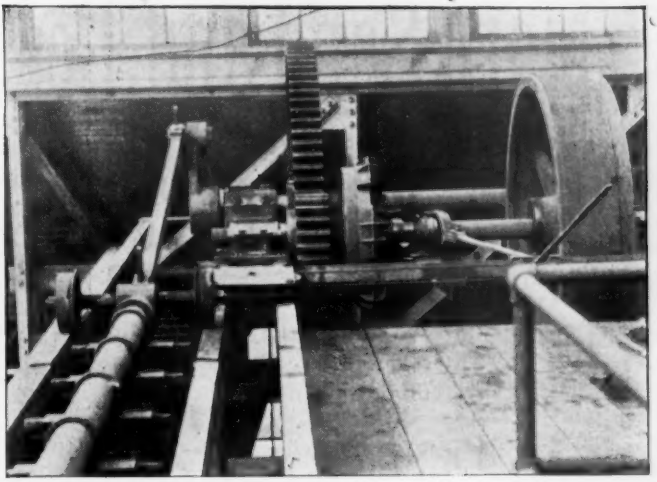
PITTSBURG, PA.

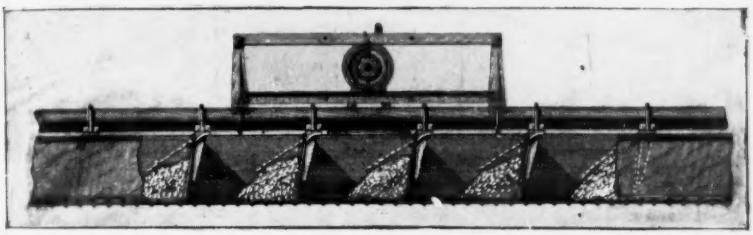
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.

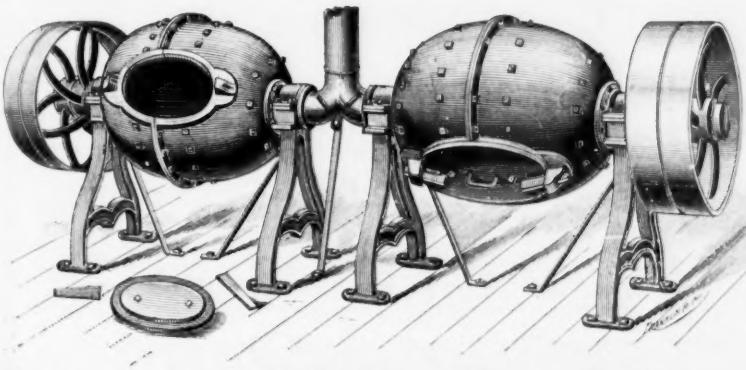




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.



# A Fine Pair

# Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

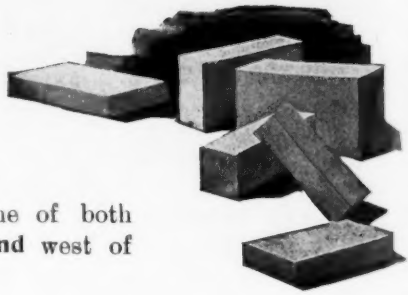
For full particulars, address,

## Stover Manufacturing Co.

205 RIVER STREET, FREEPORT, ILL

# More Sand and Less Water.

By placing your orders for **Molding Sand** early you get **more for your money** than you do later on when the damp weather sets in.



**REMEMBER** we have the largest line of both **Fine, Medium and Heavy Sand** west of Philadelphia.

**"FRANKLIN CROWN," Cupola Blocks and Fire Brick** always in the lead as a reliable product and **fully guaranteed.**

**Garden City Sand Co.,** * * SECURITY BUILDING, CHICAGO.

Telephone M. 5102 or 5138.

DO YOU MAKE LIGHT OR HEAVY

## Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

## McCORMICK'S EXCELSIOR BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

**J. S. McCORMICK CO., PITTSBURG, PA.**

FRONT VIEW NO 8 F UNIVERSAL TRIMMER.

## THE UNIVERSAL TRIMMER

The most complete machine ever made for Pattern Work, Cabinet Work and Interior Finish.

We build eight sizes and styles of Trimmers, ranging in price from $25.00 to $140.00.

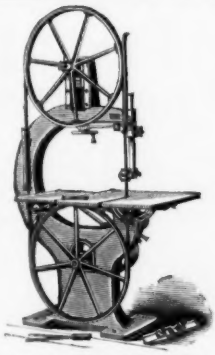
**Write for Catalogue.**

**Buy none but the Fox Patent Universal Trimmer.**

MANUFACTURED BY THE

## FOX MACHINE CO.

850 N. Front Street,
GRAND RAPIDS, MICH., U. S. A.



4 in. and 36-in. Band Saw Machine.

## ... Complete Outfits ...

FOR

## Pattern Shops

STRICTLY FIRST-CLASS TOOLS.

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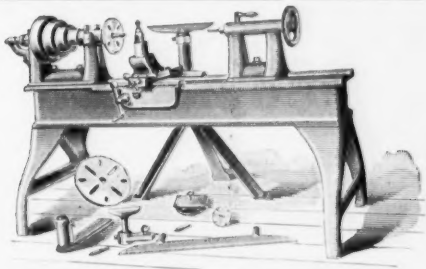
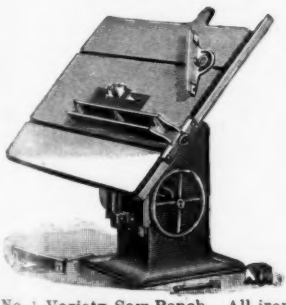


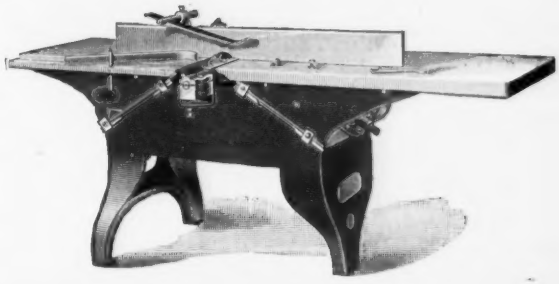
Pattern Makers' Lathes. Iron Bed with or without Carriage.

## THE FRANK H. CLEMENT CO.

336 LYELL AVENUE,
ROCHESTER, N Y.



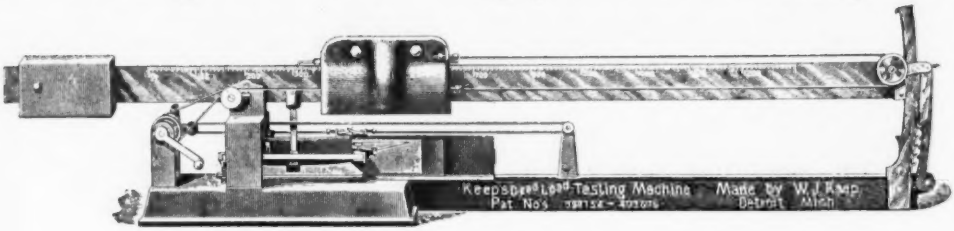
No 1 Variety Saw Bench. All iron and steel.



E. A. FORD,

GEN. PASS. AND TICKET AGENT, PITTSBURG, PA.

# "Keep's Test" Apparatus Benefits Foundrymen




76 Yanners, Ramsbottom, Lancashire, Eng.
August 30, 1898.

*Mr. W. J. Keep,*

DEAR SIR—I have for some time past been trying to keep my iron of one quality, but owing to the different qualities of scrap, I am unable to do so, and I am advised to use **"Keep's Test" Apparatus.** Please send description.

Yours respectfully, JOHN CALLISTER.

---

Detroit, Mich., Sept. 12, 1898.

*Mr. John Callister:*

DEAR SIR—I hereby send descriptive circulars. There are three manufacturers of looms at Oldham, near you, using **"Keep's Test" Apparatus.** Call upon Messrs. Hutchinson, Hollingsworth & Co., Ltd., at Dobcross. Last month I shipped a set of apparatus to Messrs. Asa Lees & Co., Oldham.

Yours truly,

W. J. KEEP.

# A GREAT BARGAIN

600 No 35 Black Lead Crucibles, best make, used only once or twice for melting nickel, and as good as new for ordinary Brass Foundry Work. Write for particulars . .

**THE HANSON & VANWINKLE CO.,**

219 Market Street, NEWARK, N. J.

---

**Foundrymen Read THE FOUNDRY**

If you want **Foundrymen** to read your "AD" **Place it Here.**

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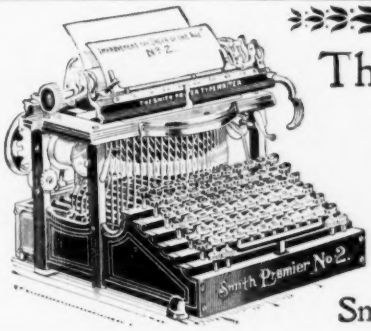


## The Smith Premier Typewriter

THE SIMPLE, DURABLE,
EASILY OPERATED,
MECHANICALLY SUPERIOR
WRITING MACHINE.

Send for New Art Catalogue.

Smith Premier Typewriter Co.,
105 Griswold Street, DETROIT, MICH.

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## MICHIGAN CENTRAL

*"The Niagara Falls Route."*

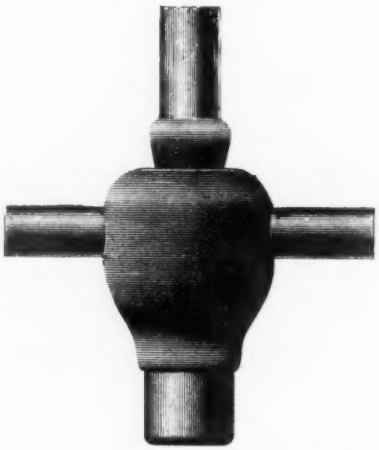
A FIRST CLASS LINE FOR FIRST CLASS TRAVEL.

ROUTE OF THE **"North Shore Limited."**

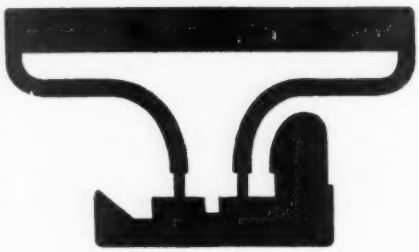
"As near perfection in the way of construction, appointments, service and able management as can be conceived in modern railroading.—*Extract from report of Railroad Commissioner, State of Michigan.*

O. W. RUGGLES, G. P. & T. Agent, CHICAGO.

# Ten Years Ago ..



Here are some of the Cores we make without Vents—do not need them . . . . . .



it would be very hard to find a foundryman who used anything but flour — good XXX flour, mind you—with which to make cores. Some of them wanted beer also, and there is a wide spread suspicion that all the beer bought did not get into the cores, either.

# Nowadays ..

it is different, and it is even harder to find an up-to-date, first-class foundryman who uses flour than it was before to find one who would do without it.

**Here is one of the reasons for the . . change . . . . . .**

## A Dollar's worth of our Oil Compound will make more Cores than a Dollar's worth of Flour and the Cores will never blow.

**Compared with Flour, our Compound costs nothing, as it more than saves its entire cost . . . . . .**

SEND FOR SAMPLE

# Holland Linseed Oil Co

683 Austin Avenue, CHICAGO

**C leveland Facing Mill Company**

**F** earlessly claim, as they have for

**M** any years, that their C. F. M.

**F** ounders Perfect Wash
**O** perates upon castings
**U** nder the most difficult conditions.
**N** ever failing to peel the castings
**D** irectly they are taken from the mold,
**E** ven if iron is poured white hot,
**R** eally seeming to be the work of magic,
**S** aving practically all expense of cleaning.

**P** aying for itself many times over,
**E** very first order brings a second
**R** ight along regularly after that
**F** rom all parts of the country—
**E** ast and West, North and South.
**C** ompetitors have often tried
**T** o equal it in quality.

**W** e smile at their futile attempts,
**A** sking only that foundrymen
**S** hould send to us for samples, which we
**H** urry forward at our own expense.

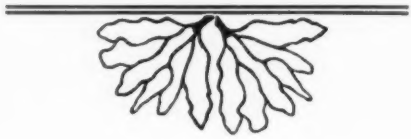
**The Cleveland Facing Mill Co**
Mill and Office—CLEVELAND, OHIO.

MANUFACTURE . . . .
FACINGS, BLACKINGS,
and SUPPLIES.

# Whitehead Brothers Company,

DEALERS IN

# Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Castings.**

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*537-39 West 27th St.,*
*NEW YORK.*

**Providence Office,**
**42 S. Water Street.**

**Buffalo Office,**
**70 and 72 Columbia St.**

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WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

# We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

## Chicago Pneumatic Tool Co.,

**635 Monadnock Building, CHICAGO. ILL.**

P. C. COCHRAN, PRESIDENT.
J. H. WURTZ, SECRETARY.

J. R. LAUGHREY, TREASURER.
J. S. NEWMYER, MANAGER.

# WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

**3500 Acres of Coal.** **5000 Tons Daily Capacity.**

300 30-TON COAL CARS — 50 30-TON COKE CARS.

**Foundry Coke Our Specialty.**

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

Over
12,000
in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

# FOUNDRIES

**PORTABLE, SELF-CONTAINED, AUTOMATIC.**

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

## Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

REQUEST CIRCULARS FROM

## THE WELLS LIGHT M'F'G. CO.,

**EDWARD ROBINSON, Sole Proprietor.**

44-46 WASHINGTON STREET, NEW YORK.

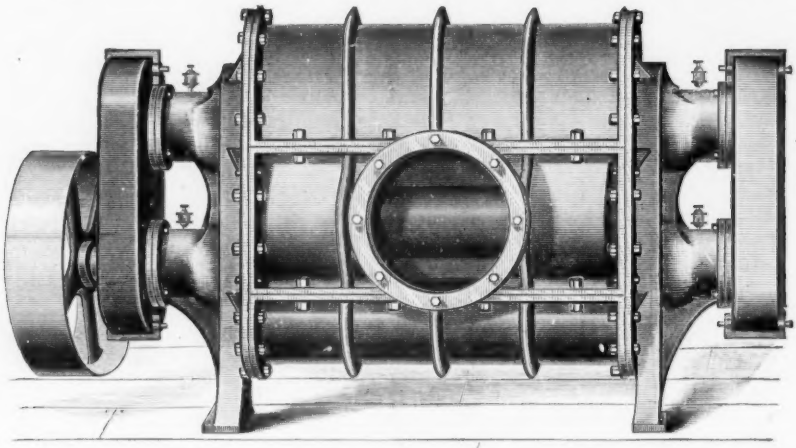
ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

*The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:*

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

# The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, detachable journal bearings, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

## High Pressure Blowers

GAS EXHAUSTERS

## Exhausters for Hot Gases

**The GREEN Gives the Most Value for a $.**

# Wilbraham Baker Blower Co

**2518 Frankford Ave. PHILADELPHIA, PA.**

Sales Agents: **Frazer & Chalmers, Inc.** CHICAGO, ILL., and BRANCH HOUSES

Established 1872. Incorporated 1895.

# McCullough-Dalzell Company

PITTSBURGH, PA.

CRUCIBLES for Brass Melting .

CRUCIBLES for Steel Melting .

CRUCIBLES for All Purposes . .

CRUCIBLES of All Sizes . . .

STOPPERS, Twenty-one Styles .

LIDS, COVERS, CAPS, . . .

PHOSPHORIZERS . . . .

PLUMBAGO FINE DUST . . .

ALL ARTICLES CONTAINING PLUMBAGO

# DIRECTORY OF LEADING PIG IRON DEALERS.

COLUMBUS, O. CHICAGO, ILLS.

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**MATTHEW ADDY & CO.**

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**DAYTON COAL & IRON CO.**

(Limited)

PIG IRON,

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**THE DOMHOFF & JOYCE CO.**

PIG IRON-COKE.

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Foundry, Forge, Charcoal and Bessemer

PIG IRON,

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**PICKANDS, BROWN & CO.,**

Manufacturers, Importers
and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

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**PILLING & CRANE,**

PIG IRON and COKE,

Carnegie Building,
PITTSBURG, PA.

Girard Building,
PHILADELPHIA, PA.

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**ROGERS, BROWN & CO.**

CINCINNATI, CHICAGO,
BUFFALO,
PHILADELPHIA, NEW YORK,
ST. LOUIS
PITTSBURG, CLEVELAND.

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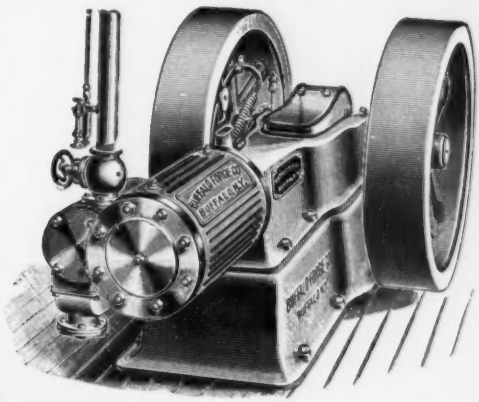
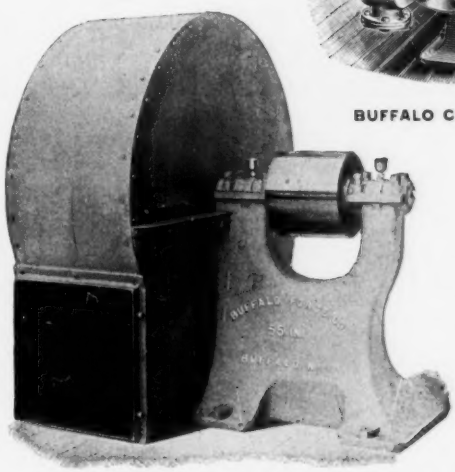
**STEVENSON, FIELD & CO.**

PIG IRON and COKE,

Columbus, O. St. Louis, Mo.



BUFFALO CLASS "A" AUTOMATIC ENGINE.



BUFFALO TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Catalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

BUFFALO CUPOLA BLOWER.

# Buffalo Forge Company,

BUFFALO, N. Y.

## ALPHABETICAL INDEX TO ADVERTISERS.


| | Page. |
|---|---|
| Adams Co., The | 24 |
| Addy & Co., Matthew | 14 |
| American Glutrose Works | 22 |
| Barnett, Estate of Oscar | 19 |
| Buckeye Light | 28 |
| Berlin Iron Bridge Co. | 25 |
| Big Four R. R. | 31 |
| Brooklyn Fire Brick Works | 23 |
| Buffalo Forge Co. | 17 |
| Brass Foundry Supply Co. | 30 |
| Brown Bros. | 15 |
| Case Mnfg. Co. | 21 |
| Chicago Pneumatic Tool Co. | 5 |
| Clinton Iron & Steel Co. | 23 |
| Connersville Blower Co. | Back Cover |
| Cornell, J. B. & J. M. | 31 |
| Cowles Electric Smelting and Aluminum Co. | Inside Back Cover. |
| Cleveland Facing Mill Co. | 3 |
| Dayton Coal & Iron Co. | 14 |
| Diamond Machine Co. | 26 |
| Dixon Crucible Co., Joseph | Inside Front Cover |
| Domhoff & Joyce Co., The | 14 |
| Garden City Sand Co. | 29 |
| Gobeille Pattern Co. | 26 |
| Goodrich & Co., F. A. | 14 |
| Gould & Eberhardt | 22 |
| Hanna & Co., M. A. | 14 |
| Hanson & Vanwinkle Co. | 30 |
| Heyl & Patterson | 27 |
| Holland Linseed Oil Co. | 32 |
| Hussman Crucible Co. | 22 |
| Irwin & Co., James | 21 |
| Keep, W. J. | 25 |
| Kelly & Co., T. P. | 20 |
| Mack, Thomas | 14 |
| McCormick & Co., J. S. | 29 |
| McCullough-Dalzell Co. | 13 |
| Michigan Central R. R. | 24 |
| Miller, Wagoner, Fleser & Co. | 14 |
| Millet Core Oven Co. | 19 |
| Mohr, J. J. | 14 |
| Obermayer Co., The S. | Inserts between front cover and page 1 |
| Paxson Co., J. W. | 1 and 2 |
| Pedrick & Ayer | 10 |
| Pickans, Brown & Co. | 14 |
| Pilling & Crane | 14 |
| Pridmore, Henry E. | 20 |
| Penn. R. R. | 28 |
| Rand Drill Co. | 24 |
| Ridgway & Son, Craig | 7 |
| Rogers, Brown & Co. | 14 |
| Roots Company, P. H. & F. M. | Colored Insert, Bet. 8 and 9 |
| Sellers & Co., Wm. | 8 |
| Smith-Permier Typewriter Co. | 30 |
| Smooth On Mnfg. Co. | 25 |
| Springfifield Facing Co. | 23 |
| Standard Sand Co. | 23 |
| Stevenson, Field & Co. | 14 |
| Stewart, W. H. | 30 |
| Stover Manufacturing Co. | 27 |
| Stow Manufacturing Co. | 26 |
| Sturtevant Co., B. F. | 9 |
| Superior Charcoal Iron Co. | 22 |
| Tabor Mnfg. Co. | 26 |
| Ward & Nash | 24 |
| Washington Coal & Coke Co. | 6 |
| Wells Light Mnfg. Co. | 11 |
| Whitehead Bros. Co. | 4 |
| Whiting Foundry Equipment Co. | 16 |
| Wilbraham Baker Blower Co. | 12 |


# THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

### RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "

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The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair, as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike and no reduction of any sort on the above rates will be made.

Copy for advertisements must be in by the 20th of the month preceding publication, to insure insertion.

# Millett's Patent Core Oven

Double Doors,
One closing the oven when the other is open.

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

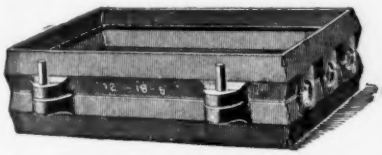
Over two hundred in use.

*Send for our new Catalogue giving names of those using them.*

## Millett Core Oven Co.

BRIGHTWOOD, MASS.

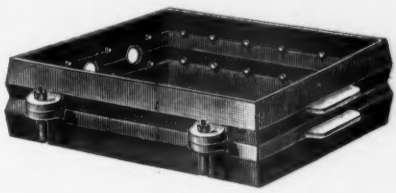
For Sale by THE J. W. PAXSON CO., Philadelphia, Pa., and THE S. OBERMAYER CO., Chicago, Ill.



HORIZONTAL LIGHT RIBBED.

State Size. Ask for Price.

Ribs in Beveled Flasks add to the weight and obstruct ramming—do you want them? You are the Doctor!



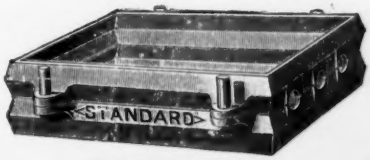
PORCUPINE.
(PAT. APPLIED FOR.) Made in 1898.

## Estate of Oscar Barnett.

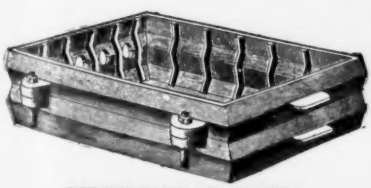
LONG DISTANCE PHONE 1045.
ESTABLISHED 1845.

NEWARK, N. J., U. S. A.

These Flasks are not milled with emery wheels and thrown together, but interchange and are perfectly fitted.



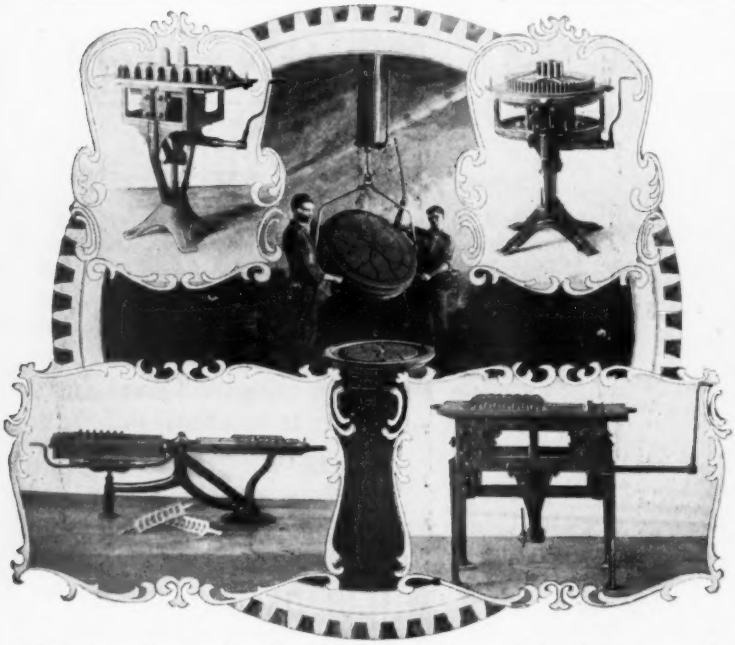

Makers of Everything for a Brass Foundry



PERPENDICULAR RIBBED.
DEMEREST'S PATENT. 1855.

OSCAR BARNETT'S OLD RELIABLE
(Standard Beveled Style.)
IT LEADS.
NOT RIBBED.
Our own foundry insures prompt shipment. Faces planed level; don't rock.

STRAIGHT SIDE, BEAD AT TOP, BOTTOM AND PARTING.



Rights to use these machines for molding malleable iron or steel castings are reserved.

## In this Illustration

are shown a few examples of special molding machines built . . for special purposes. No ready made molding machines can . . . compete with them. If you have work for a machine, have one built that will fill the bill. When you get a **"Pridmore"** you get a special machine, and not some stock affair, calculated to mold . . everything and molding nothing.

**HENRY E. PRIDMORE,** 111-113 W. HARRISON ST., CHICAGO

## Which do you wear most

your thinking cap or your working cap? The foundryman who studies to save himself labor and expense, who strives to have his castings make the best possible appearance, finds nothing so helpful as

# Kelly's Plumbago

It does the work on all grades of castings and a dollar's worth of it goes further than a dollar's worth of any other man's plumbago.

Samples, if you write for them.

**T. P. Kelly & Company,** MILLS AT . . Reissing, Pa. Bloomsbury, N. J.

WESTERN OFFICE and MILLS: 544-546 W. 22nd St., NEW YORK, N. Y.
121-127 N. Ada Street, cor. Kinzie, CHICAGO.

# JAMES IRWIN & CO

MANUFACTURING CHEMISTS,

343 Sixth Avenue, PITTSBURGH, PA.

## SULPHURIC ACID
## HYDROFLUORIC ACID

FOR CLEANING CASTINGS.

Hydrofluoric Acid is replacing Sulphuric Acid and the Tumbling Barrel with progressive foundrymen for cleaning castings. It DISSOLVES THE SAND instead of the iron, and is convenient to handle, being shipped in barrels, or in lead carboys.

SOLE AGENTS FOR

## Kentucky Fluor Spar Co.'s

HIGH GRADE FLUOR SPAR FLUX
FOR IRON FOUNDRIES
AND BLAST FURNACES.

THE

# IRON-FOUNDER.

A COMPREHENSIVE TREATISE ON

## THE ART OF MOLDING

INCLUDING CHAPTERS ON

CORE-MAKING, LOAM, DRY-SAND, AND GREEN-SAND MOLDING, ALSO CRYSTALLIZATION, SHRINKAGE, AND CONTRACTION OF CAST-IRON, AND A FULL EXPLANATION OF THE SCIENCE OF PRESSURES IN MOLDS; ADDED TO WHICH ARE FORMULAS FOR MIXTURES OF IRON, TABLES, RULES, AND MISCELLANEOUS INFORMATION.

BY SIMPSON BOLLAND,

Practical Molder and Manager of Foundries.

382 Pages—Illustrated with over Three Hundred Engravings.

Price $2.50, Post-paid; with THE FOUNDRY, One year, $3.00.

# Honest Advertising

demands that a Journal should treat every advertiser alike . .

THE FOUNDRY has but one rate. No reduction to Advertising Agencies . . . . . .

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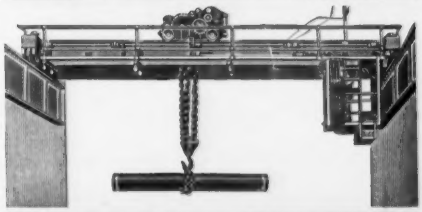
| Quarter Page, " | | 8.50 |

# CRANES
AND
## HOISTING MACHINERY



## ELECTRICAL STEAM BELT AND HAND POWER

THE CASE MFG CO
COLUMBUS, OHIO.

# Running Day and Night.

Our three blast furnaces—PIONEER, ANTRIM, ELK RAPIDS—are making 2500 tons a week of **Lake Superior Charcoal Pig Iron** that is especially adapted for all kinds of

## Malleable Work and Car Work.

High irons a specialty.
Get prices while navigation is open.

## Superior Charcoal Iron Co

GRAND RAPIDS, MICH.

# CORE COMPOUND

# GLUTROSE

(Trade Mark.)

## The Universal Liquid Core Compound

**Patented in the United States, England, France and Belgium.**

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience, It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil, molasses or any other compound in use; takes the place of all other materials and never varies in quality.

WILL MAKE FIRST-CLASS RADIATOR CORES WITHOUT RODDING.

WHY PAY 30 to 40 CENTS FOR LINSEED OIL WHEN THE SAME RESULTS CAN BE OBTAINED FOR HALF THE MONEY?

**WILL NEVER BLOW THE CASTINGS.**

## AMERICAN GLUTROSE WORKS

**Sole Manufacturers.**

OFFICE: PENN MUTUAL BUILDING,

No. 925 Chestnut St., Philadelphia.

WE MANUFACTURE

# PLUMBAGO CRUCIBLES

FOR MEN THAT

**UNDERSTAND**

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

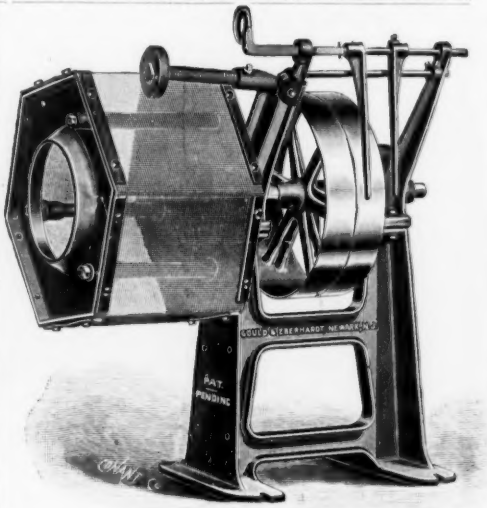
## Ceylon Plumbago

PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

**We keep it for sale.**

## Hussman Crucible Co.

ST. LOUIS, MO.




## EBERHARDT'S IMPROVED AUTOMATIC SAND SIFTER.

*Messrs. Gould & Eberhardt, Newark, N. J.:*

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

BELL & FYFE FOUNDRY CO.

## GOULD & EBERHARDT, NEWARK, N. J.

# PERHAPS YOU'RE BEING JOLLIED

by the traveling man who sells you facing. It's a man's duty to think the goods he is selling are all right and it's his duty to convince you. We are not very smart, but if we could get your ear, we could surely sell you your Charcoal Facing for either Stove Plate or Brass parting, but it costs so much to manufacture the high grade we offer that the prices they are sold for will not pay traveling expenses. We sell these goods all over the United States to people we have never seen and always sell first barrel with distinct understanding that if not satisfactory we receipt the bill.

## WHAT MORE DO YOU WANT?

Charcoal is our hobby, but no matter what others may advertise about Silver Lead, our story is just as good and we would like to send samples. We will gladly send samples of our Brass Founders' Charcoal free of charge to any concern, large or small.

**SPRINGFIELD FACING CO.,** **SPRINGFIELD, MASS.**

## SOMETHING VERY NEW!

A Standard Molding Sand for high grade castings only; at all times of the year dry; can be unloaded from the cars the same as a car load of grain; will not freeze; no water to pay for, or other foreign matter not wanted in molding sand; dried, bolted to a standard grade every time. All orders filled promptly at any time of the year. Ask for catalogues, samples and prices.

**STANDARD SAND CO.,**

H. G. BOUGHTON, Manager. EVERETT, SUMMIT CO., OHIO.

Western Agents—GARDEN CITY SAND CO., Chicago, Ill.

## Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

**"CLINTON" AND "HECTOR"**

**INSPECTED FOUNDRY IRONS . . . . .**

ALSO

**Sole Factors for DUNBAR STRONG IRON**

In New York and New England.

**FURNACES, PITTSBURGH.**

NEW YORK OFFICE, No. 15 Cortlandt St.

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ROUTE OF THE **"North Shore Limited."**

"As near perfection in the way of construction, appointments, service and able management as can be conceived in modern railroading.—*Extract from report of Railroad Commissioner, State of Michigan.*

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**FOR FOUNDRIES.**

SIMPLE. DURABLE. ECONOMICAL.

Our **Duplex Compressor,** Compound Air Cylinders, with Inter-Cooler and Compound Steam Cylinders, with Meyer Cut-off Valves, is the best construction for small and medium sizes.

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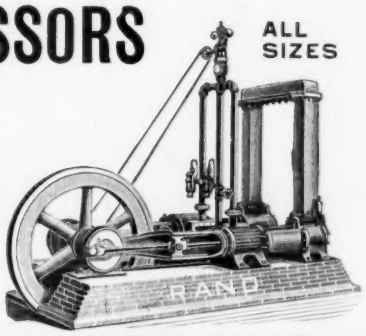


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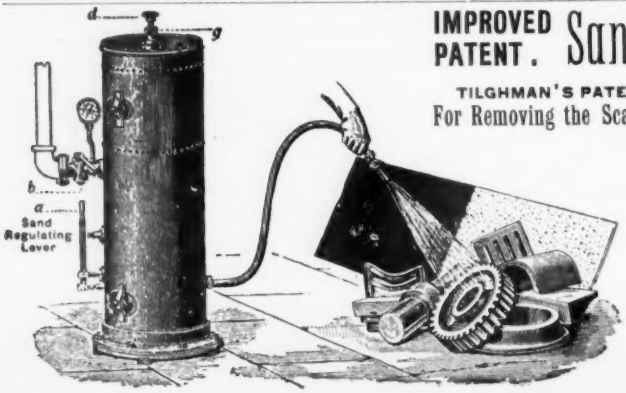


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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc.

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from financial loss for the man who will persist in throwing castings away simply because . . they contain a small hole or leak.

SMOOTH ON will cure permanently 90% of all the defects found in castings. It will stick to the casting till doomsday and even experts cannot tell the difference between a perfect casting and one made perfect by SMOOTH ON.

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Designed and Built by us
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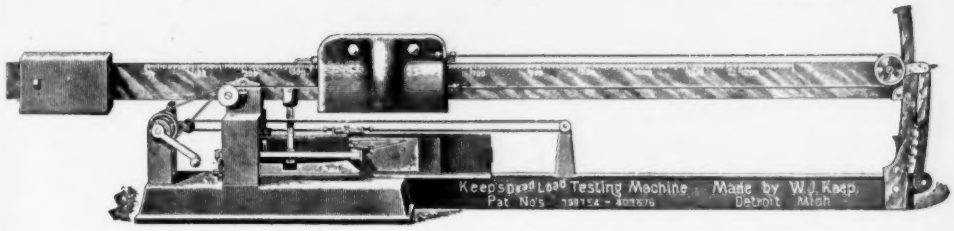
EAST BERLIN, CONN.

# "Keep's Test" Apparatus Benefits Foundrymen




76 Yanners, Ramsbottom, Lancashire, Eng.
August 30, 1898.

*Mr. W. J. Keep,*

DEAR SIR—I have for some time past been trying to keep my iron of one quality, but owing to the different qualities of scrap, I am unable to do so, and I am advised to use **"Keep's Test" Apparatus.** Please send description.

Yours respectfully, JOHN CALLISTER.

---

Detroit, Mich., Sept. 12, 1898.

*Mr. John Callister:*

DEAR SIR—I hereby send descriptive circulars. There are three manufacturers of looms at Oldham, near you, using **"Keep's Test" Apparatus.** Call upon Messrs. Hutchinson, Hollingsworth & Co., Ltd., at Dobcross. Last month I shipped a set of apparatus to Messrs. Asa Lees & Co., Oldham.

Yours truly,
W. J. KEEP.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

**USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.**

Write for information.

**The Tabor M'f'g Co.,**

ELIZABETH, N. J.

ESTABLISHED 1870.

**STOW MANUF'G CO.,**

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INVENTORS OF THE

**FLEXIBLE SHAFT**

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

**PORTABLE EMERY GRINDER**

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

BE WISE

**THE GOBEILLE PATTERN COMPANY**

(PROMPT AND RELIABLE)

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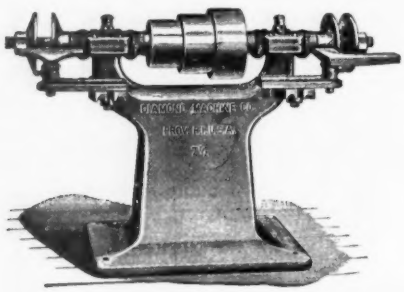

No. 7½ GRINDER.

***This Grinder***

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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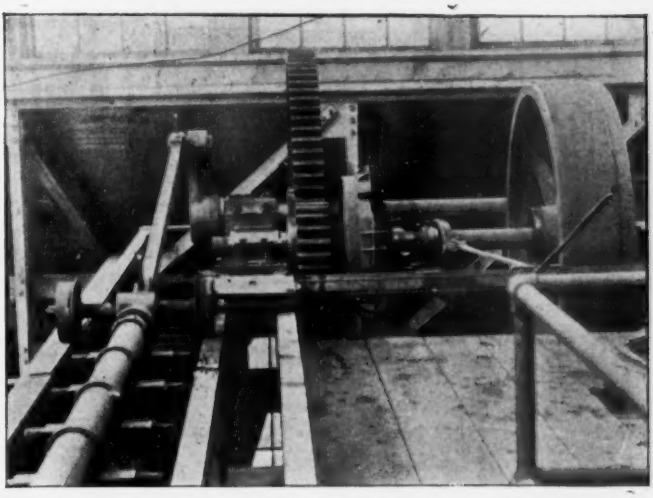
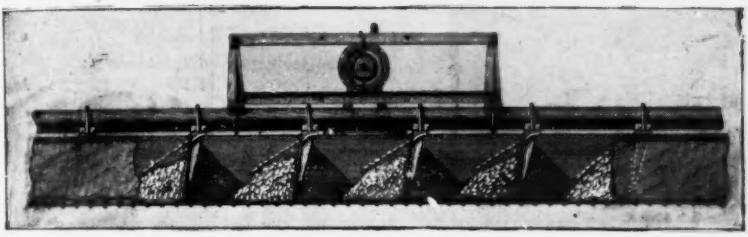
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

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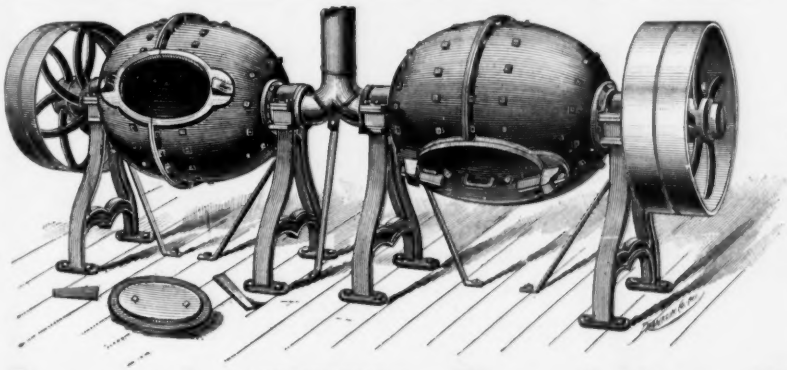
**Complete Installations.**



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# Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

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## Stover Manufacturing Co.

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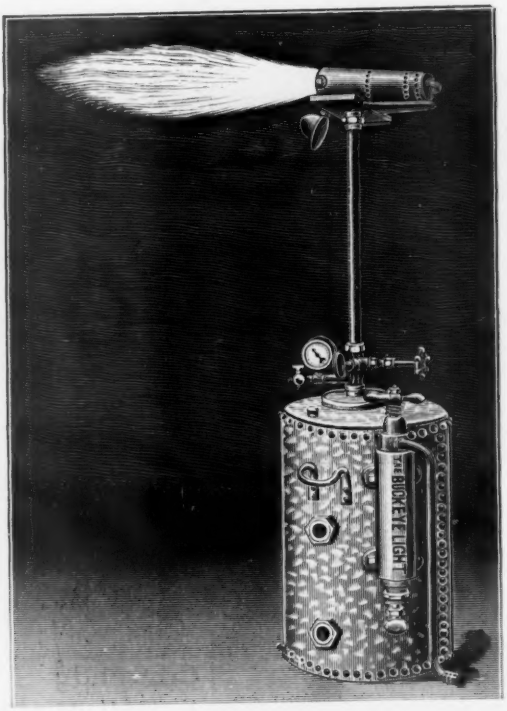


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FOR

# FOUNDRY LIGHTING

**The Only Light that will penetrate smoke and Steam.**

**IS PORTABLE.**

**Flame can be adjusted Vertical or Horizontal.**

Send for copies of Testimonials to

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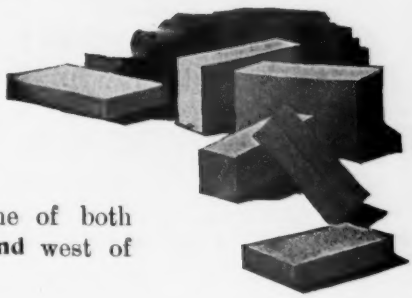
By placing your orders for **Molding Sand** early you get **more for your money** than you do later on when the damp weather sets in.



**REMEMBER** we have the largest line of both **Fine, Medium and Heavy Sand** west of Philadelphia.

**"FRANKLIN CROWN," Cupola Blocks and Fire Brick** always in the lead as a reliable product and **fully guaranteed.**

**Garden City Sand Co.,** * * SECURITY BUILDING, CHICAGO.

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DO YOU MAKE LIGHT OR HEAVY

## Dry Sand and Skin Dried Work?

IF SO, YOU SHOULD USE

## McCORMICK'S EXCELSIOR BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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600 No. 35 Black Lead Crucibles, best make, used only once or twice for melting nickel, and as good as new for ordinary Brass Foundry Work. Write for particulars . .

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SO . ARE . PRICES.

Send for catalogue if interested. ∴ Send sample for Prices on Gray Iron Castings Our **Furnaces**, round steel shell, with drop grate, are up-to date.

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OUR No. 8 F, THE LARGEST MADE.

Do not accept Imitations. They are NOT "Just as good as THE FOX."

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They turn out *smooth clean work.* See that you have plenty of them in your . . . *Pattern Shop.* Now made in *10 Sizes.*

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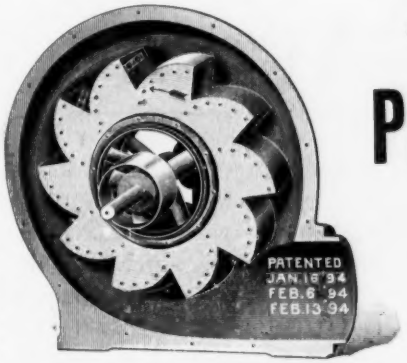


# J. B. & J. M. CORNELL,

Manufacturers of POOLE'S PATENT

# Pressure Blowers and Exhausters

**GREATER VOLUME and HIGHER PRESSURE with LESS HORSE POWER than any other type.**

**A COMPARATIVE TEST** between one of our Blowers (referred to as Blower "A") and one made by one of the best known makers in this country (referred to as Blower "B") was made by Prof. Denton, of Stevens Institute of Technology, Hoboken, N. J.

Prof. Denton says: "The general conclusions to be drawn from the experiments are: (1st) That for pressures varying from two to fourteen ozs. and quantities of air varying from 2,500 to 6,500 cubic feet per minute, Blower A delivered from 7 to 28 per cent. more air per horse power than Blower B. (2) That over the same range of pressures and volumes, Blower A utilizes in producing pressures from 6 to 60 per cent. more velocity of its blades than Blower B."

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Through Trains with Parlor and Sleeping Cars leave Detroit from foot of Brush Street, landing you direct in **Grand Central Union Station,** Cincinnati. Positively the only line avoiding depot transfers to any point South.

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# LIQUID CORE COMPOUND

Used by many of the largest and well-known Iron and Brass Foundries in the United States, Canada, Great Britain and Germany. It is the standard article for making cores.

Send for Decriptive Circular.

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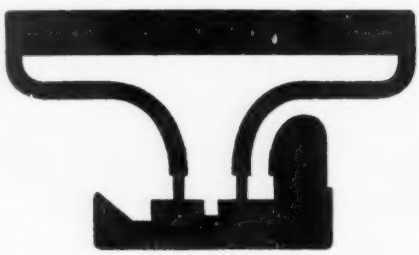
# Ten Years Ago ..

Here are some of the Cores we make without Vents—do not need them . . . . . .



it would be very hard to find a foundryman who used anything but flour — good XXX flour, mind you—with which to make cores. Some of them wanted beer also, and there is a wide spread suspicion that all the beer bought did not get into the cores, either.

# Nowadays ..

it is different, and it is even harder to find an up-to-date, first-class foundryman who uses flour than it was before to find one who would do without it.

**Here is one of the reasons for the . . change . . . . . .**

**A Dollar's worth of our Oil Compound will make more Cores than a Dollar's worth of Flour and the Cores will never blow.**

**Compared with Flour, our Compound costs nothing, as it more than saves its entire cost . . . . . .**

SEND FOR SAMPLE

**Holland Linseed Oil Co** 683 Austin Avenue, CHICAGO

There are Two Kinds of
ROTARY PRESSURE
BLOWERS

# THE ROOTS

AND OTHERS

OUR BLOWERS . . . . .

represent all the "up-to-date" ideas and embody (what no other . . . . blower can) forty years of experience in the construction of this type of machine . . . . . .

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not – cannot.

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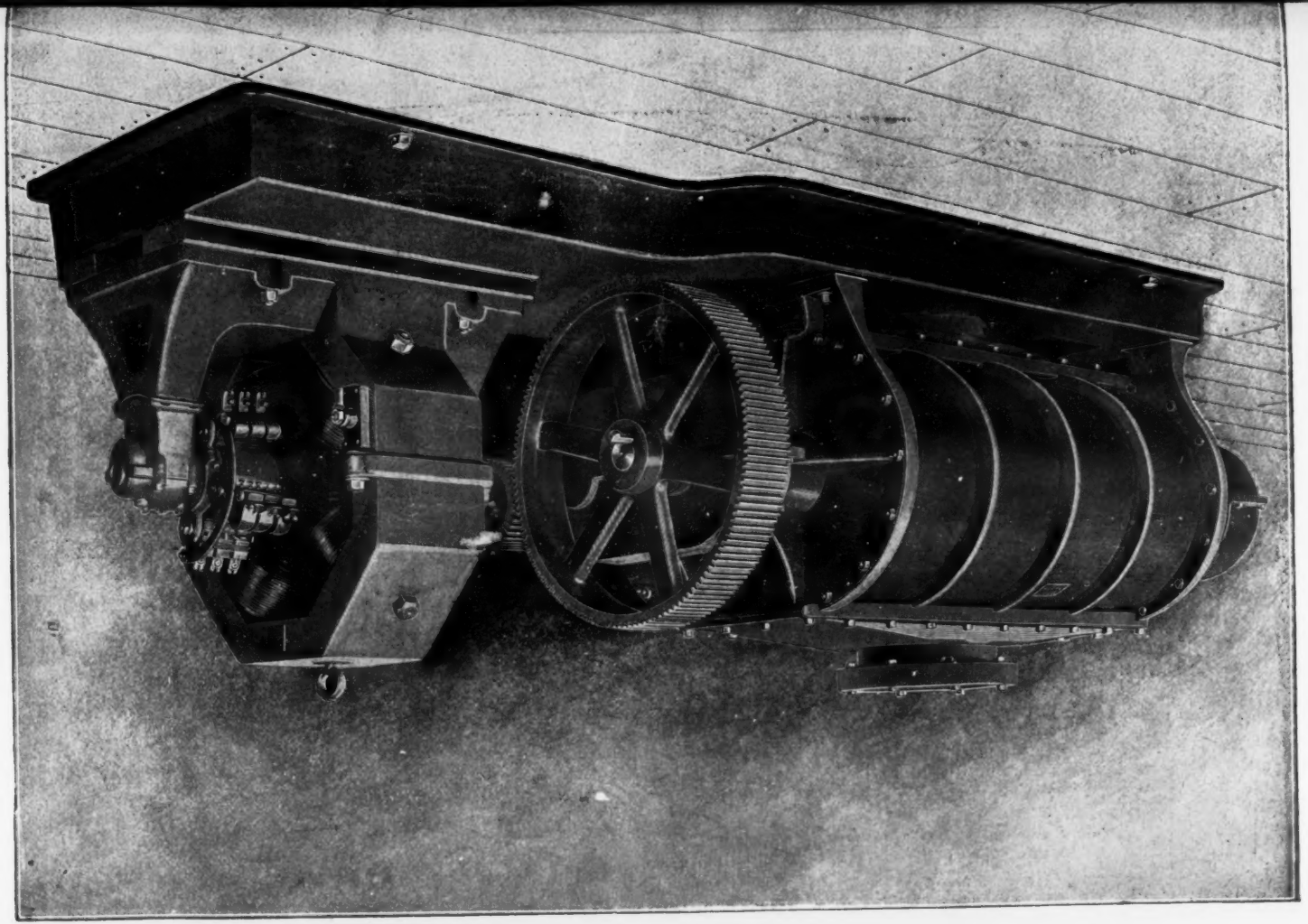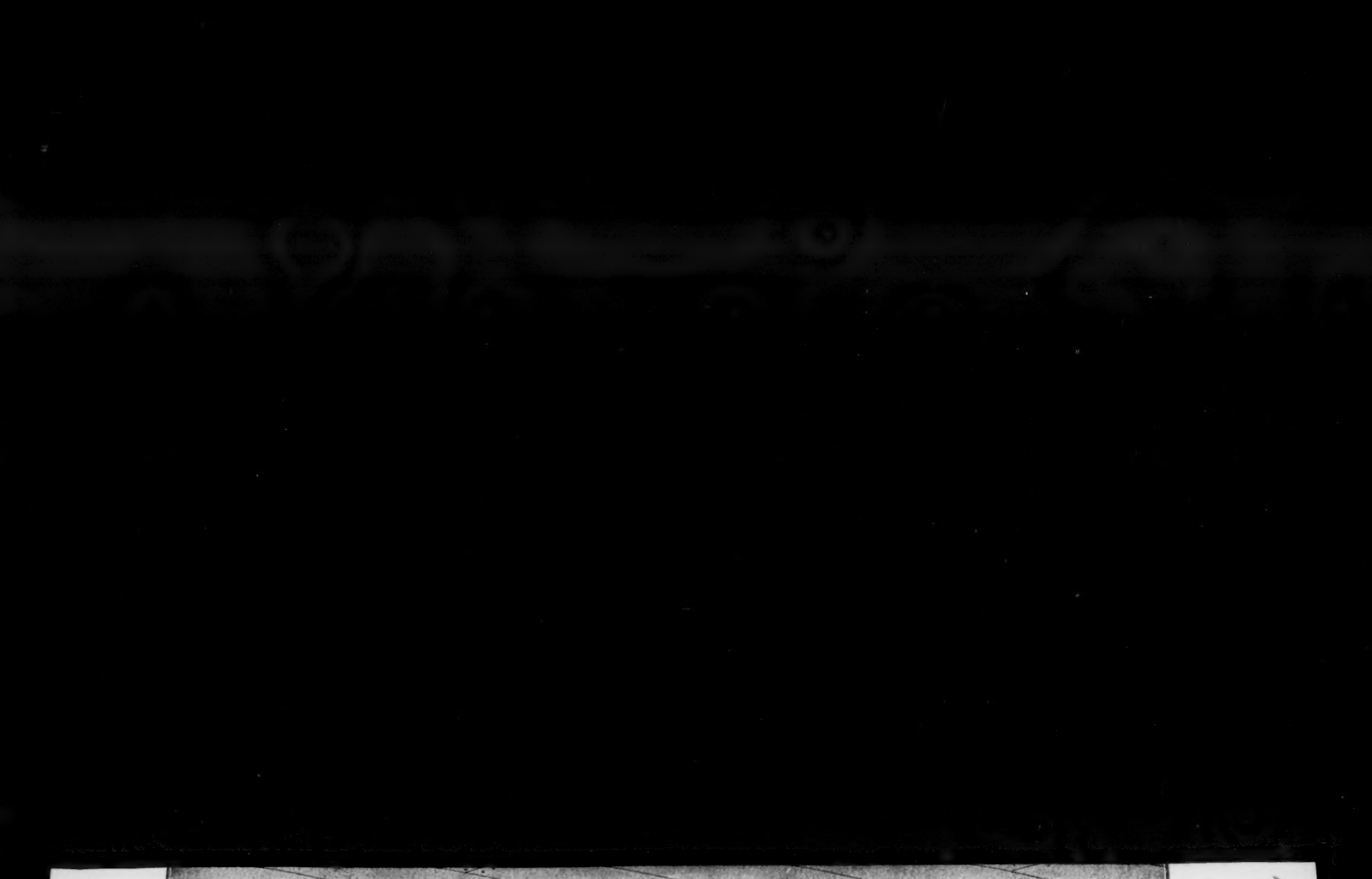
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